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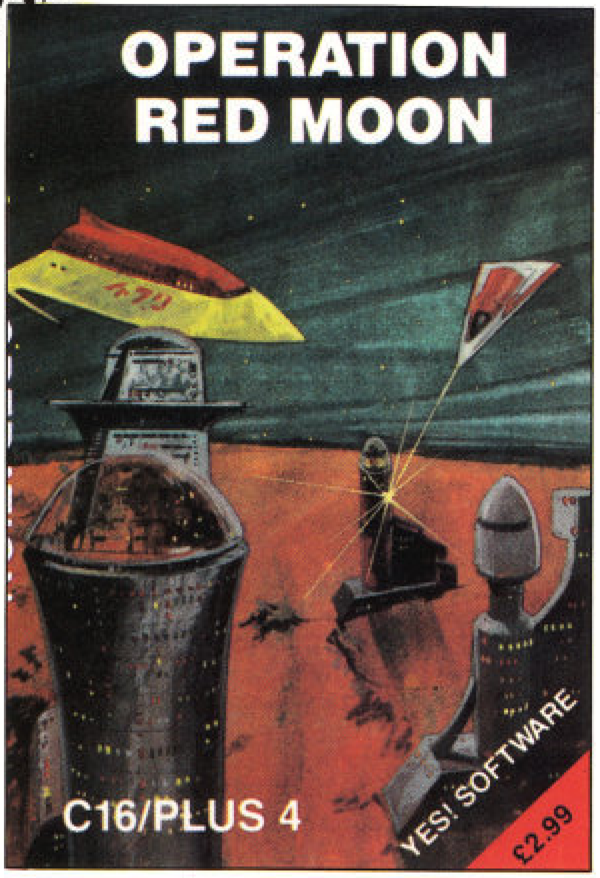
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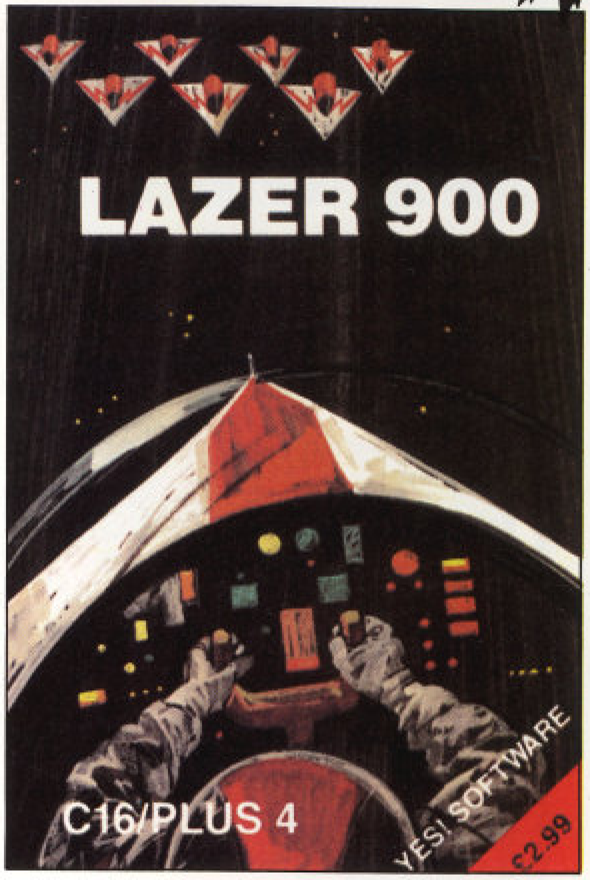
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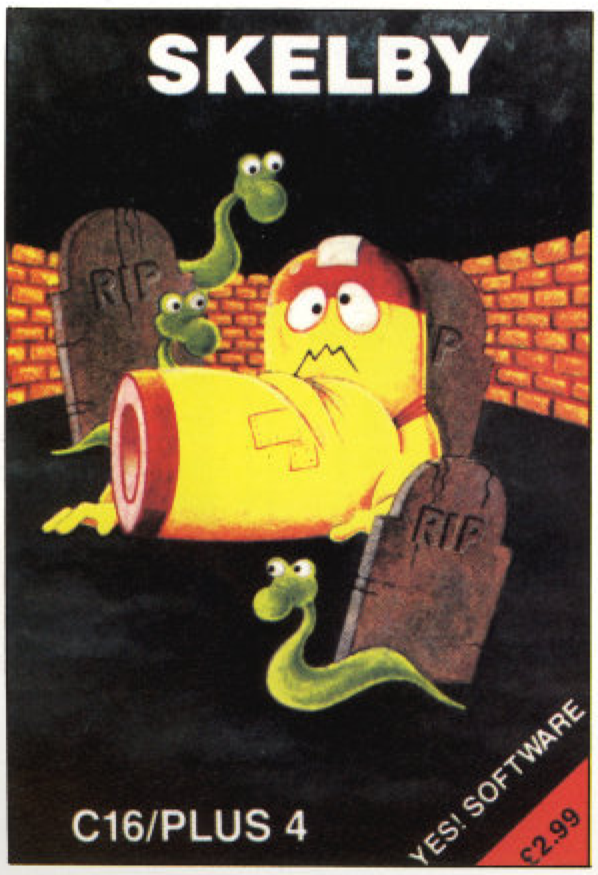
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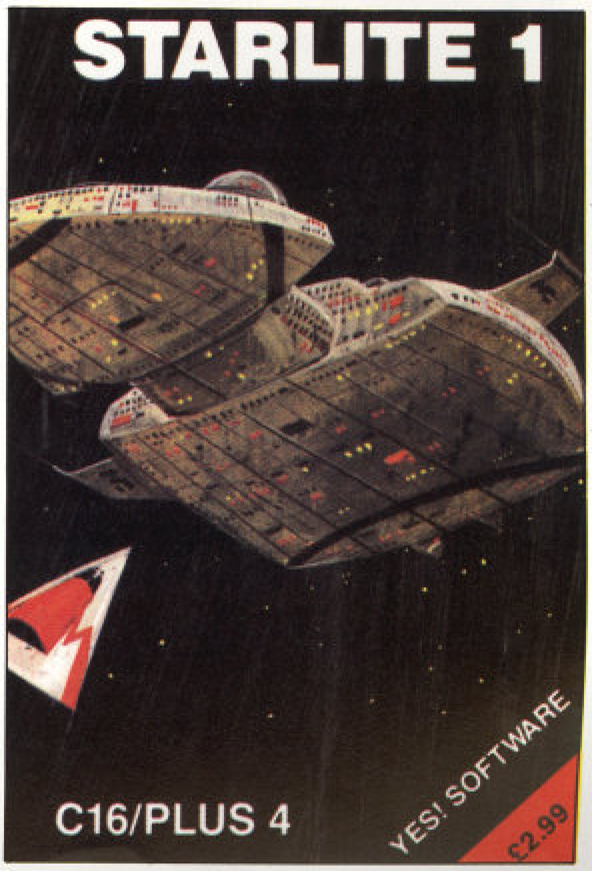
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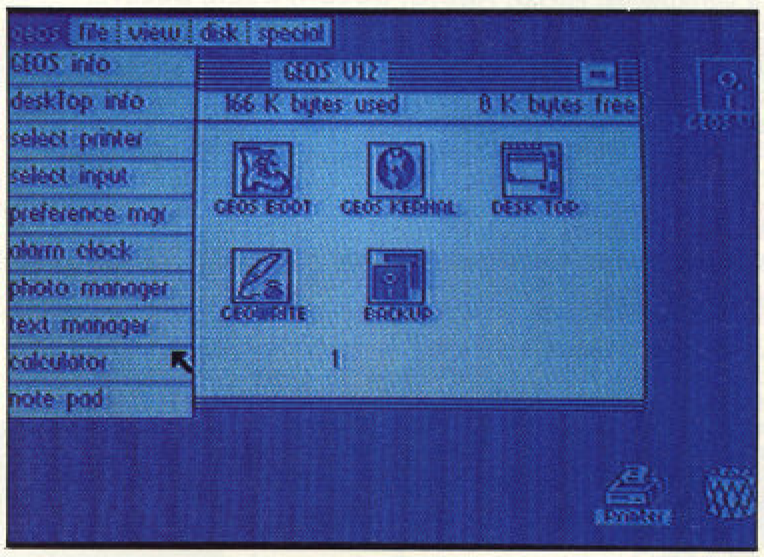







### FEATURES






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## RESET AND FREEZE
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# DATA STATEMENTS




## Welcoming the 64C

Commodore's long awaited and much trumpeted 64C has finally been released in a classic Commodore gift pack in time for the Christmas rush.

Billed as a new personal computer for home, schools and businesses, Commodore describes its design as pace-setting and its colouring (the same as the 128's) as eye-catching ivory and grey.

Described as completely compatible with the C64 (and believed to be a C64 with a face lift by many in the know), Commodore claims buyers of the new machine will have access to the largest software base in the world.

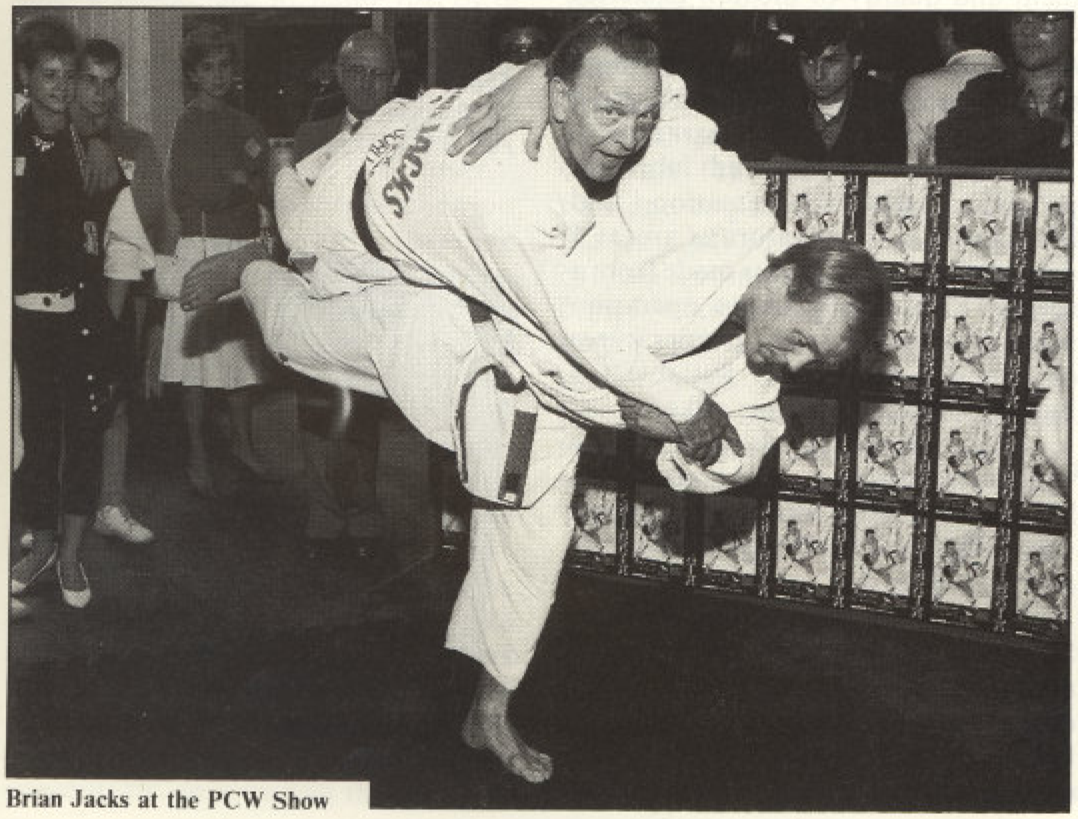
Commodore's aim in launching the new machine is to use it to form the basis of a second generation of operating methods and facilities, completely new to the home computer marketplace.

Commodore's Chris Kaday commented: "The mixed business and home computer audience at this (PCW) show has exposed this product to the broadest potential user base possible. Their intitial reaction bodes well for every associated person and company in the computer industry, retailers who are eager to sell it and software developers who will enjoy the challenge of producing new packages to exploit its facilities."

The 64C has been launched in a package including games and a mouse under the label *Connoisseur's Collection*. The exact contents of the package is as follows: the 64C plus cassette unit, mouse and cheese colour graphics software, Pitmans Typing Tutor, plus computer versions of the board games Monopoly, Scrabble, Cluedo, Chess and Renaissance.

The price of the *Connoisser's Collection* is £249.99.

***Touchline***
***Commodore UK:** 1 Hunters Road, Weldon, Corby, Northants*
***Tel:** 0536 205555*



Brian Jacks at the PCW Show

## Get Up and Go

The ever popular sport games market is still proliferating new titles.

The latest from the US Gold stable are *Super Cycle* (Epyx) and *Go for Gold* (Americana).

*Super Cycle* is a motorbike simulation, your machine is a 750cc job and the game pits you and your bike against the road, curves, your rivals and, of course, the clock. First choose your machine and leathers, then devise your tactics. There are deadly obstacles for you to negotiate as you speed your way around the circuit; water, ice and oil make the going tough at every turn. A realistic instrument panel helps you get the best from your machine using the Tachometer and speedometer. Super Cycle is available

# DATA STATEMENTS

on the C64 for £9.95 cassette and £12.95 disk.

*Go for Gold* is a budget sports simulation featuring six events. There is the 100m sprint, the long jump, 110m hurdles, archery, weightlifting and springboard diving. To exert yourself mentally if not physically will cost a mere £2.99 cassette and £4.99 for the disk version.

Golf, baseball and basketball – championship style – are all now available from America's Gamestar software house courtesy of Activision UK. Prices start at £9.99.

*Championship Golf* takes you to the famous Pebble Beach course where you begin by surveying each hole from an overhead view. Full and split screen views allow you to plan your shot. Club selection, foot position and direction are all under your control as is the motion of your swing from start to finish. Remember to compensate for the wind from the ocean.

*Championship Basketball: Two-on-Two* allows you to compete in a team and devote yourself to the spirit of the game. The roar of the crowd, the swish of the net, slam-dunks(!), three-point shots – all these features are included. You can also compete in a four division, 23 team league.

*Championship Baseball* has batting practice, ninth inning rallies, catching, pitching, outfield rallies, base running and sliding under tags. You become player and manager by selecting your team and competing yourself. After each game you can review the division standings to check your progress in the race for the pennant.

From the Far West to the Far East, Anco brings you *Thai Boxing* for the C64 (with an enhanced version for the C128 on disk). C64 cassette is priced at £7.95 with the C64 disk version at £9.95. If you want to go one step further on your C128 then the disk is £11.95.

Another game in the physical violence genre is *Uchi Mata* from Martech. Satisfied with only the best, Martech has taken on International Judo champion Brian Jacks as technical consultant. Brian said: "I am very pleased with the results I have seen so far. Not only is it a fun game to play, it can be used as an accurate training aid." A copy of the C64 version should now be awaiting you in your local computer games store.

***Touchline***

***US Gold:*** *Units 2-3, Holford Way, Holford, Birmingham B6 7AX.* ***Tel:*** *021 356 338.* ***Activision:*** *23 Pond St, London NW3 2PN.* ***Anco:*** *35 West Hill, Dartford, Kent DA1 2EL* ***Tel:*** *0322 92513.* ***Martech:*** *Martech House, Bay Terrace, Pevensey Bay, E. Sussex BN24 6EE* ***Tel:*** *0323 768456.*




## Latest Flops

Verbatim is offering improved design, packaging and testing to buyers of *Optima*, a new top of the range minidisk.

Verbatim's claims for the development and quality of the new diskettes are high indeed. The disks are subjected to over 100 tests during manufacture and are thus certified 100% error free and carry a lifetime guarantee.

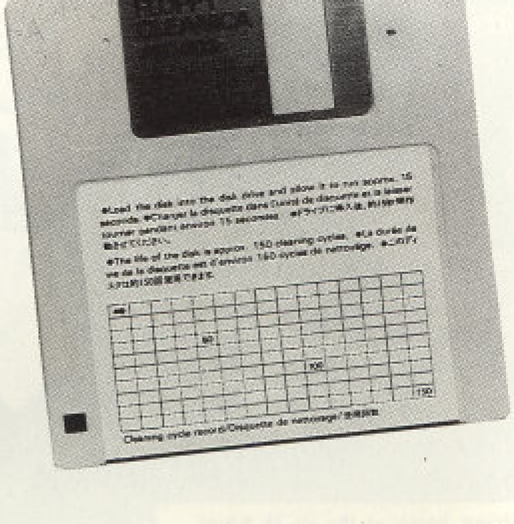
A specially formulated lubricant produces optimum retention and lubrication in temperaturs as low as 5 degrees C and its jacket is made from a special PVC which allows operation without deformation in temperatures of over 70 degrees C. Suitable for Eskimos and Australians alike.

Audio Technicia is a company which also wants to make your disk headaches a little less severe. *Floppy Cleanica* cleans up floppy disk heads and so avoids disk errors.

Features of the product include: Safe design containing no magnetic materials or compounds; safe, quick cleaner prevents disk errors; suitable for single and double sided drives; cleaner is dry requiring no liquid; operation is the same as for ordinary disks; can be used up to 150 times.

The $5^{1}/_{4}''$ version costs £19.95.

***Verbatim;*** *Philips and Hind Associates, 29 Adam and Eve Mews, High Street, Kensington, London W8 6UG.*
***Audio Technicia;*** *Technicia House, Lockwood Close, Leeds LS11 5UU.* ***Tel:*** *0532 771441*



# DATA STATEMENTS

## Cartoon Time

Ariolasoft has signed up two major Hanna-Barbera cartoon series and is producing them as computer games.

Both cartoons will be recognisable to viewers of children's TV.

*The Centurions* are a supreme unit of three men made all powerful by Exoframes on to which they attach advanced assault weapons. Each Centurion thus gains the power of 1000 men and becomes both man and machine – the embodiment of Power-extreme.

In *The Challenge of the Gobots*, renegade forces on the planet Gobotron have been forced to flee. They are led by the ruthless Cy-Kill, the reckless Crasher, the cold blooded Cop-Tur and the Godzilla of Gobots, Zod.

They are matched in strength by The Guardians, led by the good Leader 1, the courageous Turbo, the computer wiz Scooter and three human allies Matt, Nick and AJ.

Both games are released on the Reaktor label from Ariolasoft for the C64 and C128.

***Touchline***

***Ariolasoft:*** *68 Long Acre, Covent Garden, London WC2E 9JH* ***Tel:*** *01 836 3411.*




**Wyn Holloway - snowed under**

## In the Sticks

According to the Makers of the *Speedking* joystick, the demand for their product has been so great since its launch in January this year, that they have been hard pressed to meet it. In fact Konix claims that demand has outstripped supply three times over.

This situation has now changed (see pic) with Konix fairly drowning under a waterfall of joysticks coming off the production lines at the factory in Tredegar, Wales. So if you have had a yearning for a new *Speedking* joystick for the last twelve months and met with bitter regret and disappointment at your inability to obtain this coveted possession then you can now breath a sigh of relief.

Wyn Holloway of Konix said (as he loomed out of a cardboard box): "We would like to thank all our customers for their patience over the last few months. Now that the joystick can be produced in sufficient numbers we can concentrate on ensuring the best joystick yet is also the best-selling joystick yet." The price is £12.95.

Cheetah Marketing also believes that it has the ultimate joystick with the *Mach 1*. Features of the *Mach 1* which Cheetah hopes will justify this claim are: four fire buttons, two in the base and two in the handle, to ensure that both left and right handed players can use it comfortably; fast return-to-centre action; rapid action slider switch for autofire; four gripping suction pads on the base. It's built from high impact, wear resistant material with top quality micro-switches and a high grade metal shaft. The cost? £14.95.

***Touchline***

***Konix:*** *Unit 12-14, Sirhowy Hill Industrial Estate, Tredegar, Gwent NP2 4QZ*

***Cheetah:*** *1 Willobrook Science Park, Crickhowell Road, St Mellons, Cardiff* ***Tel:*** *0222 777337*



**Mach 1 from Cheetah**

# DATA STATEMENTS

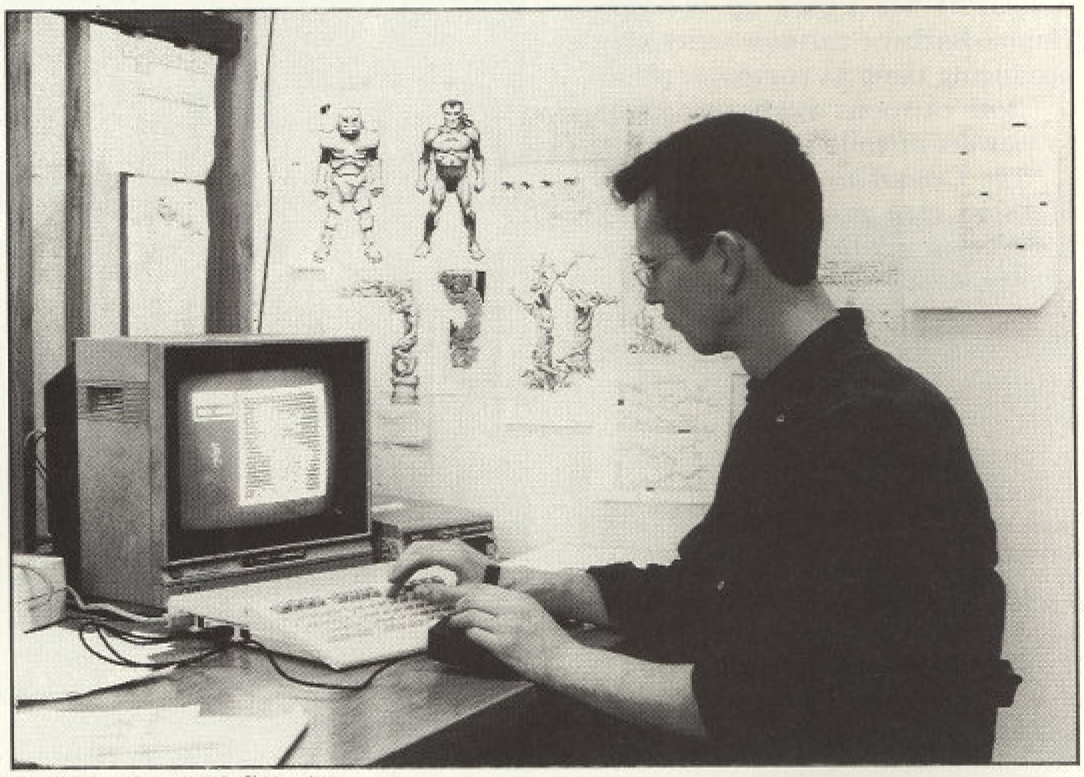
## Weird and Wonderful

Palace Software, makers of the classic *Cauldron* games, have now announced the release of *The Sacred Armour of Antiriad* on the C64.

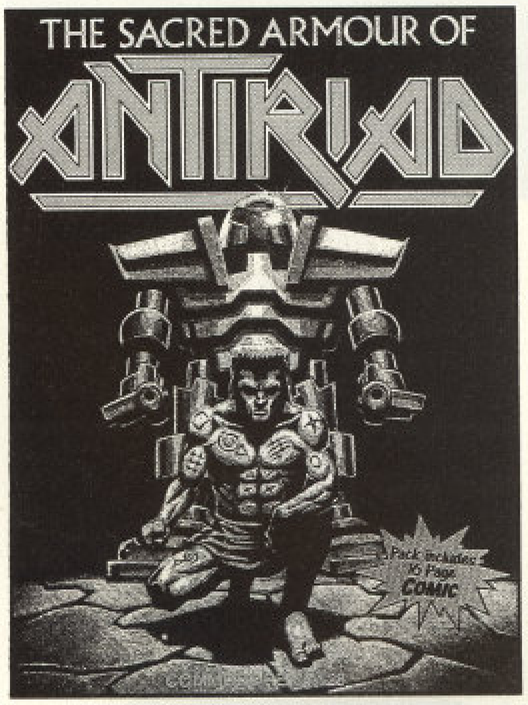
*Antiriad* is a visually stunning arcade adventure. And Palace's faithful programmers have put in months of work to perfect the animation, graphics and sound.

Written and designed by comic artist Dan Malone, the sound track and sound effects were created by Richard Joseph and *Antiriad* was programmed by Stanley Schembri. Included with the game is a 16 page illustrated booklet, also by Dan Malone, which explains the legend of the Sacred Armour and the background to the game.

*Antiriad* will initially be available on C64 cassette at £8.99 and a disk version is forecast although a date has not been finalised.



**Dan Malone - Antiriad's artist**




New from Rainbird Software (developed by Magnetic Scrolls) is *The Pawn*. An adventure set in the magical world of Kerovnia. There are separate versions for the C64 and C128 both consisting of two disks and retailing at £19.95.

King Erik, ruler of Kerovnia, is going through a bad time, what with famine and bankruptcy. The peasants are beginning to find him revolting and are thinking of revolting themselves. Part of Erik's bad press is due to the fact that the Roobikyoub dwarfs, makers of the best whiskey in Kerovnia, were all banished under suspicion of assassinating the queen. Other drinks manufacturers are using their influence to keep the dwarves out of the country and with a general election looming the king is becoming pretty worried. Here you arrive, to restore peace, prosperity and whiskey to the deprived peasants. Or do you? First you must discover your goal and then find the best way to achieve it.

Features of *The Pawn* include: a sophisticated language parser allowing complex sentences and extensive vocabulary; 30 atmospheric illustrations; a graphics window allowing the player to scroll graphics up and down the screen over the text; word processing style text editor; representation of all characters as if they existed in a real world, storing complex information about their attributes and properties linked to their particular position or context in the game.

***Touchline***
***Palace Software:*** *275 Pentonville Road, London N1 9NL* ***Tel:*** *01 278 0751.* ***Rainbird:*** *74 New Oxford Street, London WC1A 1PS* ***Tel:*** *01 240 8838.*

## Into the Underworld

CRL has brought us another game from the St Bride's Classroom, this one's called *Bugsy Maroon* and features a pale blue rabbit who lives in 1922 Chicago and wants to take over from Al Capone to become Public Enemy No 1.

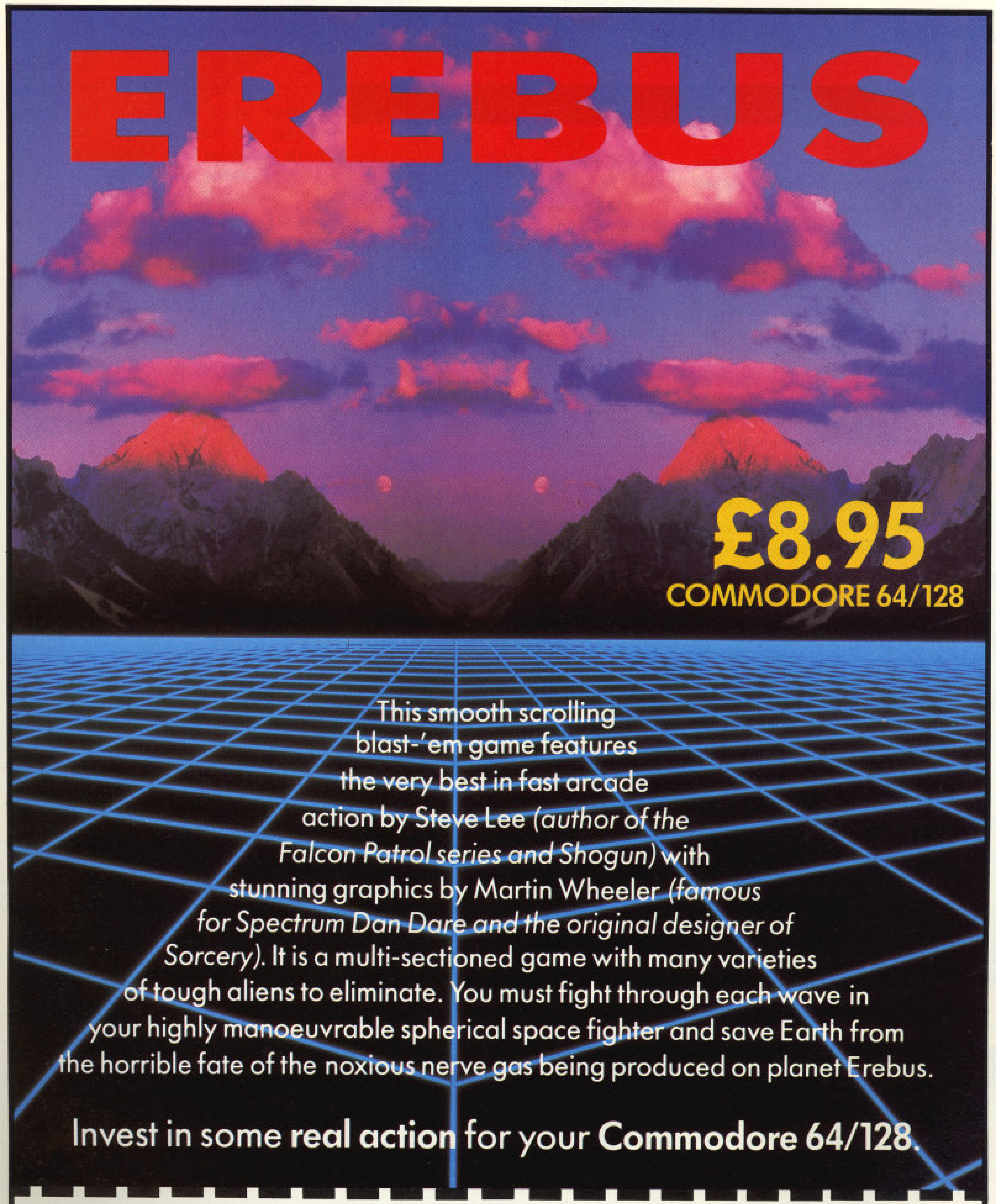
This game is for those who like violence, theft, bribery and corruption with a lot of tongue in cheek humour thrown in.

It's now available for C64/C128 at £7.95 cassette and £12.95 disk.

Ariolasoft is also getting into the world of crime with its new release *They Stole a Million*. You're the boss of a small time gang, just out of jail, so of course you're short of money.

Using vital blueprints you choose your target and then all you need is a gang. There are five targets to choose from ranging from a High Street jewellers to a bank bullion raid and there are 18 criminal characters to help you succeed plus five fences to get rid of the stuff and turn it into the ready money that you want. C64 cassette is £9.95 and the disk is £14.95.

***Touchline***
***CRL:*** *CRL House, 9 Kings Yard, Carpenters Road, London E15 2HD* ***Tel:*** *01 533 2918.* ***Ariolasoft:*** *698 Long Acre, Covent Garden, London WC2E 9JH* ***Tel:*** *01 833 3411.*




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# DATA STATEMENTS

## Indoor Games

Sports Simulations may be popular but so are computer versions of games which are strictly for those who don't like being out in the cold. Here's a batch of the latest.

Bug Byte's latest release is *Miami Dice* (subtle pun boys!) which is a Craps game simulation – American rules. You can choose the players from eight different characters, rename them, place bets and then roll the dice. There's a table zoom facility and animated players who will even comment on the game. *Miami Dice* was launched by Bug Byte using a real crap table (see pic) and specially invited guests could have a shot at winning a Bug Byte T-shirt or even a pair of underpants. Like all games in the Bug Byte range, *Miami Dice* is £2.99. A C64 version is available.

Alligata's latest release is Pub Games for the C64/128. It costs £9.95 on cassette and the disk version is the same price.

Seven games are included in both formats. These are all traditional pastimes to be found in the smoke filled, beery atmospheres of alehouses around the country. There is table football, dominoes, poker, pontoon, skittles, bar billiards and of course darts.

***Touchline***
***Bug Byte:*** *Victory House, Leicester Place, London WC2H 7NB.* ***Tel:*** *01 439 0666.* ***Alligata:*** *1 Orange Street, Sheffield S1 4DW* ***Tel:*** *0742 755796.*



**Peter Holme of APS with a stationery spectator**

## Model Citizens

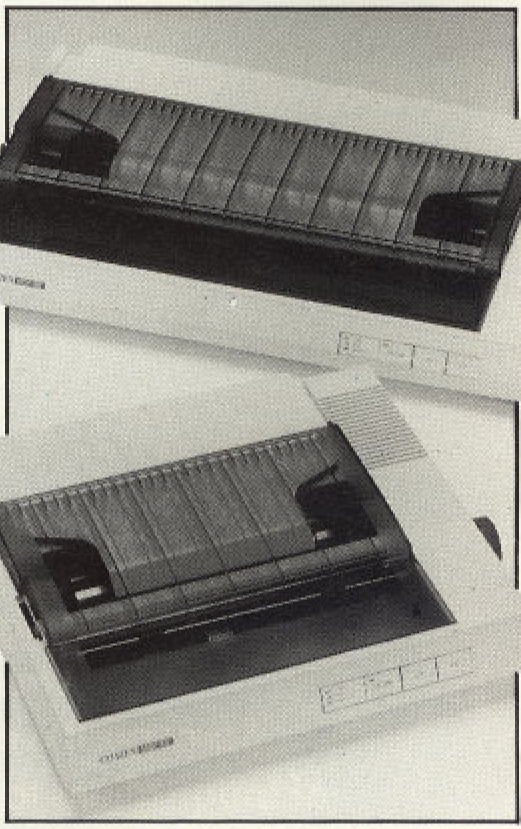
Three new printers are being added to Citizen Europe's extensive range. The models are the HQP 45, the MSP 10E and the MSP 15E.

The HQP 45 has a 24 pin (12 × 12 staggered) printhead with thermal protection, print speeds of 200 CPS in draft mode, 132 CPSA in correspondence mode, and 66 CPS in letter quality mode. It has built in push feed, RS232C serial interfae as standard, paper out sensors, a 24K buffer and automatic paperload plus numerous other specifications. The HQP is now available.

The MSP 10E is an 80 column printer while the MSP 15E prints across 132 columns, apart from that both machines have identical performance characteristics. Draft output is 160 characters per second and NLQ speed is 40 characters per second. Other features include standard 8K buffer, full bit image graphics, proportional spacing and built in IBM and Epson compatibility. The MSP 10E sells for £349 and the MSP 15E is £449.

***Touchline***
***Citizen Europe:*** *Wellington House, 4-10 Crowley Road, Uxbridge, Middx UB8 2XW.*
***Tel:*** *0895 72621* YC

**Citizen's MSP 10E and 15E**



YOUR COMMODORE

As you will now have realised, if you are one of our regular readers, Your Commodore is a magazine which never stands still. We're always aiming to make the magazine a more enjoyable read both in content and looks.

In accordance with this, to celebrate the new year, our January issue will have a bright distinctive new logo, so keep your eyes peeled for this.

The January 1987 issue will also appear one week early on the shelves at your newsagen so rush out and get it on the 28 November.

The February issue will be published on the usual date, that is the first Friday in January 1987.



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Distributed in France by Ocean France. Telephone: 93-42-7144. Distributed in Germany by Rushware. Telephone: 2101-70040.

GAME OF THE MONTH

# Druid

*Enter the dank, dark depths of Firebird's latest masterpiece and see if you can survive.*

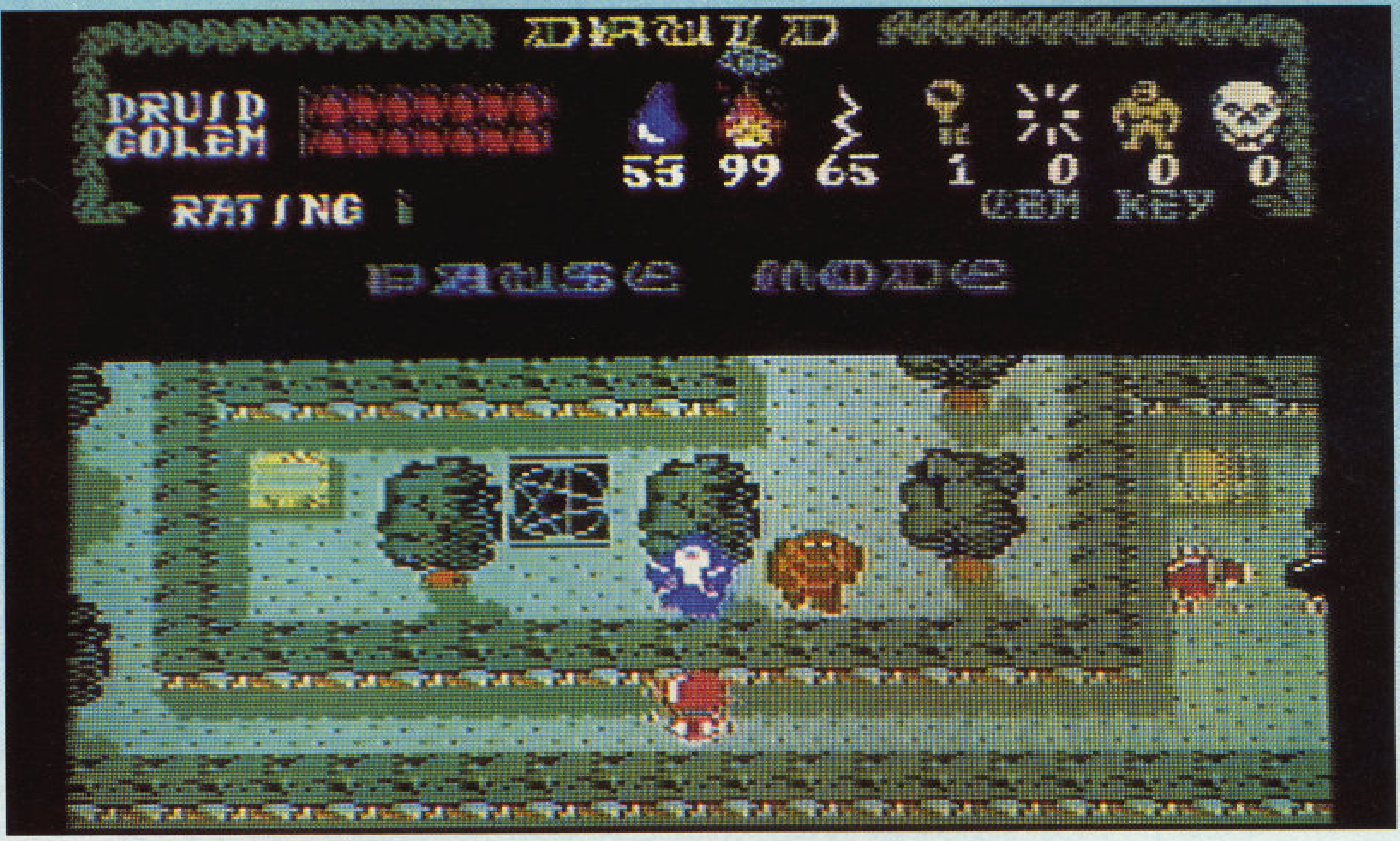
***By Stuart Cooke***

The arcade game gauntlet has certainly started off a new craze in computer games. Many companies are producing clones or programs similar to this superb arcade game. Firebird's offering is Druid. It has everything you would expect, spells, scrolling dungeons, treasure and obviously an overall goal. What's more it is exceptionally easy to play. Give it a couple of minutes and you'll be hooked. Even so it's going to take you quite a while to win.

The object of the game is to guide your druid through numerous levels of dungeon and find your evil skulls that were created by the Princes of Darkness. At the start of the game our Druid finds himself wandering around a forest with a number of spells to protect him. No sooner has he started on his quest than the enemy lets his goats and giants at you. Be thankful that your druid is carrying a number of water spells as a quick blast from one of these is enough to banish the nasties back to whatever plane of your C64's circuitry they came from.

The water spell isn't the only one that your druid can use. He has access to fire and electricity spells which effect different monsters that he meets upon his travels, different spells having more effect on some nasties than others. A key spell enables him to open any doors that he comes across, if he should want to. Invisibility spells allow your druid to disappear for a short time. Chaos destroys everything in



sight and perhaps the most interesting of all spells, the Golem spell gives your druid an aid by his side.

You can replenish your supply of spells by searching the treasure chests that you find on your way. Be warned however, make sure that you choose the right item from the treasure since the rest will disappear as soon as one item is removed.

The Chaos and Invisibility spells are quite easy to understand, the Golem however needs further explanation. The Golem when brought into life will wander around the playing area either under the contorl of yourself or that of a second player, with a second joystick. The Golem has no interest in its own safety and kills everything that it comes into contact with, even if this does mean that his energy is reduced and he will finally disappear into nothing. If you are letting the Druid control the Golem then it does take quite a lot of handling. Getting the Golem to go where you want it to is sometimes nigh on impossible. Quite often he'll simply get in your way so that you can't move anywhere. When another player takes control the game becomes much easier. With the Golem taking care of the nasties the Druid has much more time available to him to find treasure chests and the way deeper into the complex, and hopefully to the four skulls.

Energy is something that not only the Golem loses upon contact with the enemy but the Druid also suffers from this type of loss. As with most mortals, the druid does only have one life. He can however replenish his energy but standing upon one of the mystical pentagrams that are to be found while chasing after the skulls.

The graphics used within the game are in the main excellent with only a few of the monsters lacking in reality. There's nothing worse than watching a quivering ghoul heading towards you when you've just ran out of spells. The monsters lack any real intelligence and seem to take the shortest path to you. This means that a nasty will quite often find itself stuck behind some object be it a wall of some foliage allowing the druid to pick it off at his leisure.

The actual playing area consists of a number of large scrolling levels. The scrolling of the background being very smooth. As with real life the fact that you don't see the whole screen is annoying when you find you've just battled your way past a horde of giant ants only to find yourself at a dead end and having to retrace your steps.

Druid is an excellent game. It is extremely simple to play with minimal controls, the joystick is used for movement with just a few keys to select spells etc, but extremely difficult to master.

The numerous levels of the game are enough to keep both the newcomer to computer games and the arcade freak hooked for quite some time.

*TOUCHLINE Title:* ***Druid.*** *Price:* ***£7.95.*** *Machine:* ***C64.*** *Supplier:* ***Firebird, Wellington House, Upper St Martin's Lane, London WC2H.*** *Tel:* ***01 379 6755.***

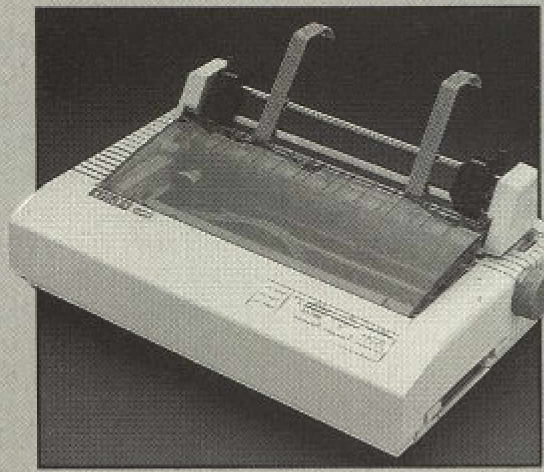
*Originality:* ***7/10.*** *Playability:* ***10/10.*** *Graphics:* ***10/10.*** *Value:* ***10/10.***

YC

# Win A Citizen Printer

*Citizen has teamed up with your Commodore to offer a very special prize to celebrate this Christmas issue.*

One of the most important pieces of hardware that any Commodore owner could have is a printer. Should you write your own programs then it is essential that you have a printer so that you can produce listings of your work so far. You can throw away your old biro's and start to produce professional looking letters to send to your friends, or more likely your bank manager. All in all you shouldn't be without one.



However there is one small problem, a good printer is so expensive.

Well now, for one person at least, your problems may be over.

Citizen is offering, as a prize for this month's spot the difference competition, an excellent 120D dot matrix printer. Priced at £197 + VAT this printer offers all of the following features:

Expanded, compresses and double strike print.
Italics, superscripts and subscripts.
Correspondence quality print for producing high quality printouts.
International characters for 11 countries.
Programmable graphics.
It prints 120 characters per second.
It will behave as either an Epson compatible printer or an IBM graphics printer.
Easy to access switches for selecting different modes.
Plus lots more.

As you can see the 120D is a very special printer, whoever wins it will certainly find it useful.

So that the printer will work straight away with your Commodore computer a Commodore printer interface is also being included so that you will be able to use the printer with your Commodore software.

## How to Enter

Study the pictures on this page. There are several differences between the two.

Mark the differences on the picture which is attached to the entry coupon that complete the rest of the coupon and send it to us. Make sure that you write clearly. Write the number of differences you found on the back of the envelope. YC

**Citizen Competition Entry** **Closing date:** Monday, December 29, 1986.





Entries will not be accepted from employees of Argus Specialist Publications and Citizen. This restriction also applies to employee's families and agents of the companies.

The How to Enter section forms part of the rules. The editor's decision is final and no correspondence will be entered into.

Send your entry to: Citizen Competition, Your Commodore, 1 Golden Square, London W1R 3AB.

Write clearly and fully and don't forget to write the number of differences you have found on the back of your envelope.

**Name** ..........................
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..........................
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**Number of differences found** ........

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**SYNDROMIC PRICE £77.50** ☐

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TOTAL AMOUNT OF ORDER inc postage if applicable £.......... I enclose postal/money/bankers order/cheque made payable to SYNDROMIC MUSIC to the value of £............

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YC2

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Please tick the product box that you are ordering and circle the appropriate disk or cassette logo so that we may process your order efficiently. Photocopy or tear out the entire page and return it with your payment to SYNDROMIC MUSIC, 24/26 Avenue Mews, London N10 3NP. Telephone 01-444-9126.

# Wigmore Offer

*Your Commodore together with Wigmore House present a host of special offers on their mouse and related material.*

This Christmas Commodore is placing, among other items, a mouse and graphics software on cassette. We reviewed this mouse in the March '86 issue of Your Commodore and were very impressed with it.

Wigmore, the company which markets the mouse, has recently released a new package called Artist 64 to which we gave a glowing review in the November 1986 issue of the magazine.

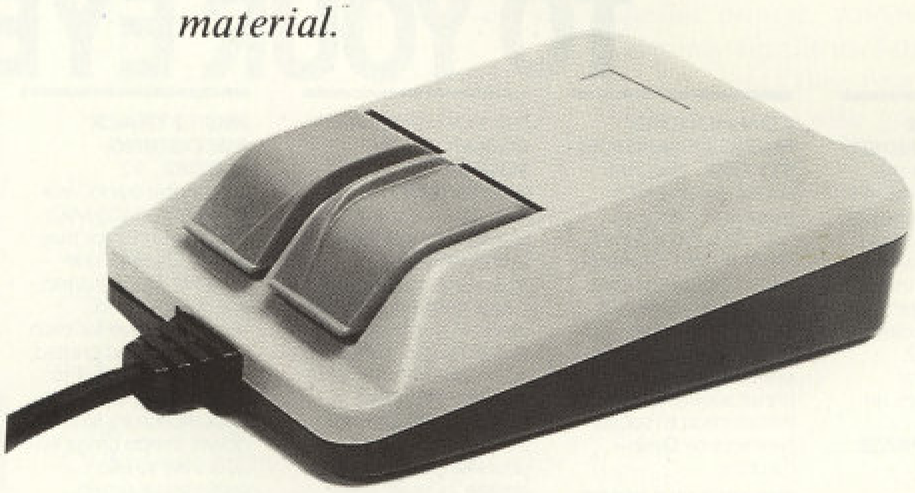
Because we were so impressed by the mouse and its associated software we have teamed up with Wigmore House to provide our readers with a series of special offers based around these products.

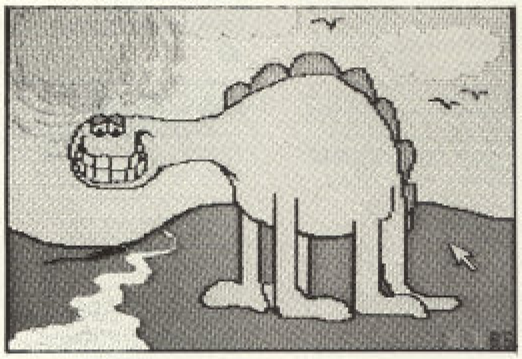
1) Firstly we have the mouse itself. As previously mentioned Commodore was so impressed with this package that it has been bundled into the Christmas Connoisseur's collection package. The Software *Cheese* is supplied on cassette and is an excellent introductory graphics package. The mouse is well constructed and even has a mode which enables it to imitate a joystick.

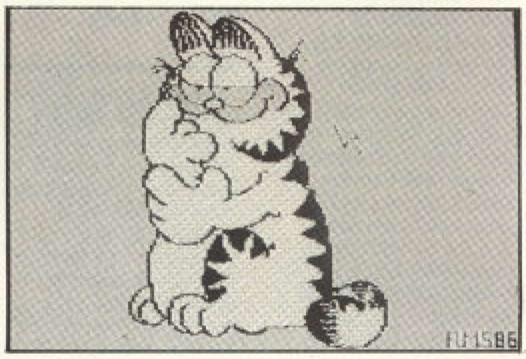
The usual price for this package is £49.99. We are able to make it available to you for just £42.90 plus £1.50 p&p.

2) As mentioned above the graphics package that comes with the mouse is a tape only version. Wigmore has made a disk available and we are also offering a special offer on this. This may also be of interest to purchasers of Commodore's Christmas pack who would want their mouse to work with disk. Price, just £7.90 plus 75p p&p compared to a normal price of £8.50 plus p&p. The disk software loads at 5-6 times normal disk speed.

3) *Artist 64* is an excellent graphics package and we were extremely impressed with its range of capabilities. It is in fact probably the most versatile graphics program that we have seen. You don't need a mouse to use it as the software will quite happily work with joystick.







Price, just £29.50 plus 75p p&p. Usual price £34.90.

4) *Desk Top* takes the mouse even further. It gives your C64 (or C128 in C64 mode) a range of interesting utilities which are accessed by the mouse. The package includes such features as a 100 year calendar, a diary, a clock, calculator, disk utilities and much more. Price £17.50 plus 75p p&p for cassette and disk. YC

## Wigmore Order Form

**I would like to order the following Wigmore products**

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|---|---|---|---|---|
| Mouse + Cheese cassette | £44.40 | ROYC1 | | |
| Cheese on Disk | £8.65 | ROYC2 | | |
| Artist 64 | £30.25 | ROYC3 | | |
| Desk Top - cassette | £18.25 | ROYC4 | | |
| Desk Top - Disk | £18.25 | ROYC5 | | |

Name ..........................................................

Address ..........................................................

..........................................................

POSTCODE ..........................

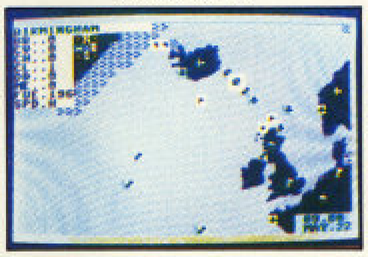
I enclose a cheque/postal order for £........... made payable to **ARGUS SPECIALIST PUBLICATIONS LTD.**

All orders should be sent to: *Your Commodore*, Readers Services, Argus Specialist Publications, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS. Please allow 28 days for delivery.

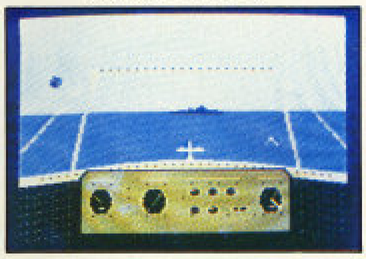
**Battle for Midway, Battle of Britain, Theatre Europe, Falklands '82, Iwo Jima, AND NOW -**

# Bismarck

MAIN MAP



COCKPIT VIEW

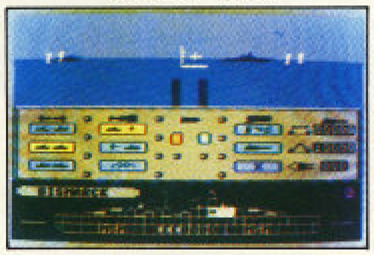


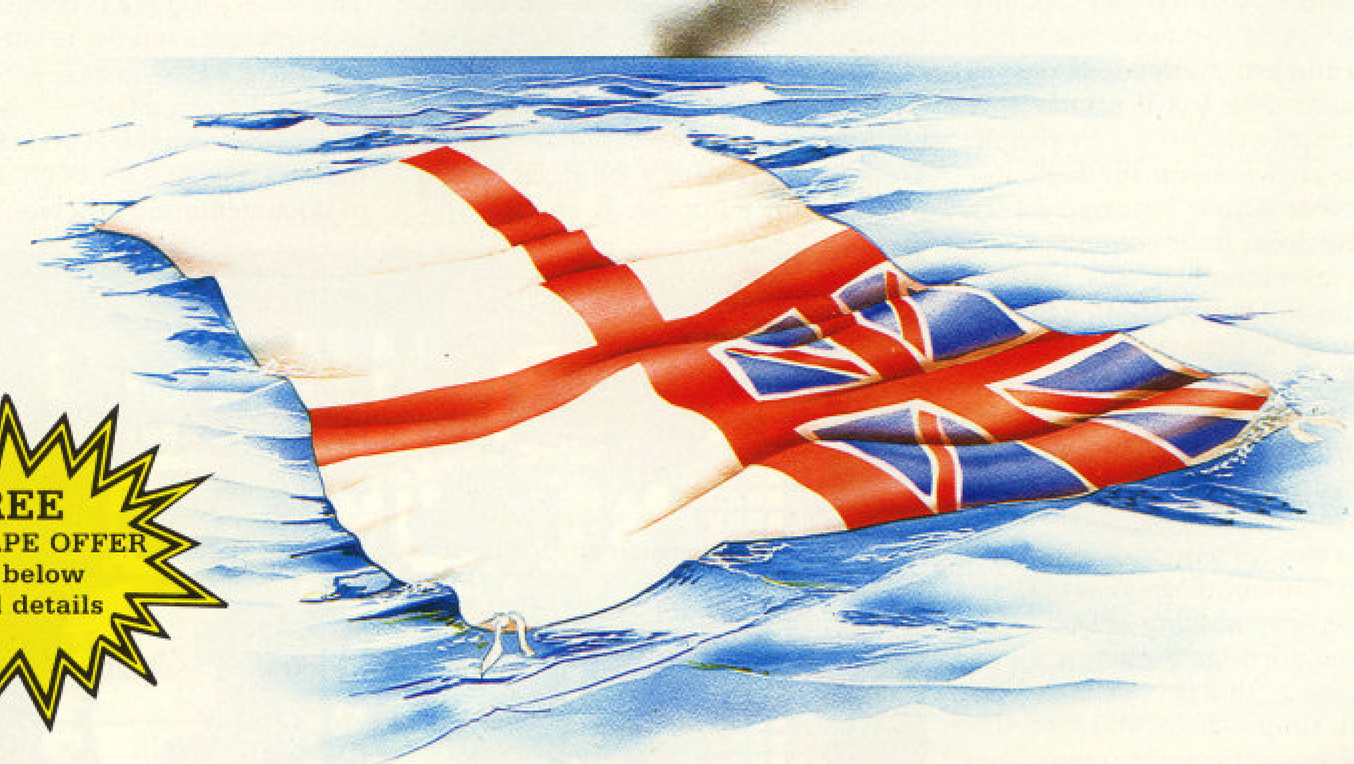
## On the evening of 24th May 1941, HMS Hood took a direct hit in her magazine. Of the 1415 men on board, only 3 escaped with their lives. BISMARCK had claimed her first kill.....

AIR RECON MAP



BRIDGE VIEW





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**CBM 64/128 9.95 (C) 14.95 (D)**

WARGAMERS SERIES

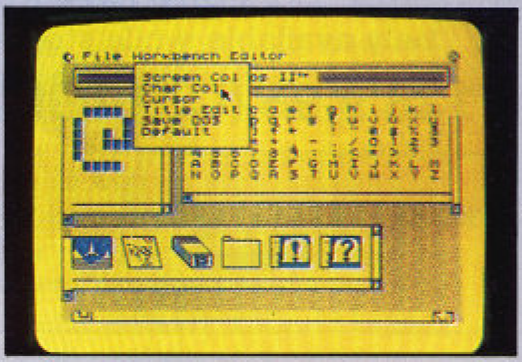
PSS

# Club 128

*A look at what is available on Compunet this month together with details of a very special free offer*
***By Neil Day***

I've been reflecting recently on that great enigma: the John Bull Rolled Oats packet. It carried a large picture of John Bull, with top hat and Union Jack vest, proudly carrying a packet of John Bull Rolled Oats. If you looked carefully you could see that this illustrated packet had its own picture of John Bull: smaller but equally resplendent, and he was definitely carrying a further, microcopic, packet of rolled oats. Many a breakfast was absent-mindedly consumed by people seeking the answer to the fundamental question of how many ever-diminishing John Bulls could be seen, assuming, as economists say, perfect information and better printing than is usually found on the average porridge packet! Historians of the future might seize on something like this to explain the capacity of twentieth century man to deal with recursively structured computer languages!

It was the selection of items to mention in this month's review of Club 128 that set me thinking about John Bull and the porridge packet. A lot of the very best things available on Compunet simply help you use the network more efficiently. Once you can make better use of it, you find even more programs and information that enable you to use Compunet even more effectively, and so on. I'm not sure if the cycle of exploring and learning about the network would rival the number of John Bulls an enthusiastic porridge eater could discern, but it is a lot less fattening!



## Enhancer

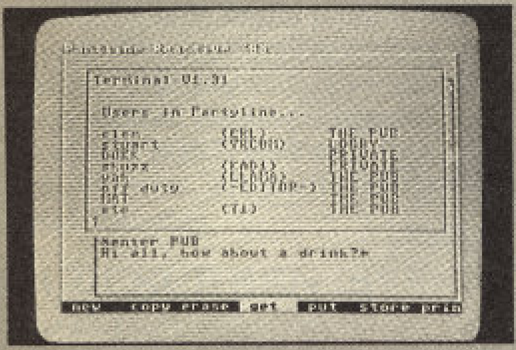
One of the most popular programs available on Compunet is the Editor Enhancer uploaded by MACHI. For readers who aren't familiar with it, Editor Enhancer adds graphics capabilities to the Compunet Editor program that comes built in to the modem you purchase. It enables you to add spectacular graphics effects to Compunet frames, and can be used with different character fonts to produce a range of large "typefaces". Various users have designed their own fonts, and, typical of Compunet, these are freely available for other users to download. There are more than a dozen fonts to choose from!




If you're new to Compunet, you'll find a number of frames about the Enhancer if you GOTO ENHANC. £6.95 is the asking price, more than reasonable in comparison with the cost of similar commercial graphics software.

## Utilities

The CNET UTILITIES area (GOTO 242) includes many other programs that make life easier for Compunetters. Most of these have a very professional feel about them. For sheer excellence of design and quality of documentation you would be hard-pressed to find a program superior to Epson Driver by AS9 (GOTO 182512). If you have an Epson compatible printer, this program is an essential purchase as it lets you print text or graphics from Compunet frames. The impressive thing about the program is its flexibility: when printing text the user can set up the page length and the horizontal position where the frame will be printed. For dumping graphics there is a wide range of choice. For



instance, the translation of each of the 16 colours can be set by the user to one of three printed tones.

the program costs £5.50, more than reasonable given its usefulness and quality.

## Icons

There are many other programs of interest to the serious applications user. For example a AKMDOS uploaded by AM12 has recently been updated. This provides an icon drive disk operating system as well as other features. It costs a mere £1.99 (GOTO AKMDOS).

These programs show the advantages of buying user software on Compunet. You can read the documentation at your leisure before purchase. There are detailed reviews available in the directories alongside the program, or you can GOTO REVIEWS for a full set. It is easy to contact the programmer or the reviewer with queries. And, if my experience is anything to go by, the authors are only too keen to discuss the use of their programs and consider modifications or improvements, try that with commercially purchased software! Finally, you can hear the opinions from a range of other users. For instance some comments by purchasers have been uploaded near the DRIVER program, covering the use of the interface with a range of printers.

## Free Modem

Compunet is making a very attractive offer to non-members. For £15 plus £3.50 postage you can get a free modem with three months subscription to Compunet's Gold service. This provides, if anything, more facilities than the home user is likely to need. You must undertake to remain a member of Compunet for at least a year: but that should be no problem! Get in touch with any Compunetter. The incentives that Compunet is offering those who recruit new members should ensure a warm welcome!

If you can't find the frames mentioned in this article, it is possible that they have died. If possible, I'll try to resurrect them, and leave a note of any changes in the YOURCBM directory (GOTO YRCBM) or the MAGAZINE SCENE directory (GOTO MAGS). YC

*Touchline*
***Name: Compunet Teleservices Limited, 7-11 Minerva Road, London NW10 6HJ***
***Tel: (01) 965 8866.***

# Wimp

*Create an easy to use icon environment in your own programs with the first routine in a new series.*

**By Allen Webb**

This is the first part of a series of routines for the slightly more serious user. Over the months, I intend to describe some routines which will simplify the writing of Basic programs. The majority of routines will be in machine code thus allowing you to perform complex sequences by the use of a simple SYS call.

This first package is somewhat larger than most and provides three quarters of a WIMP environment. For those of you who don't know, WIMP means, Window, Icons, Mouse and Pointers. This package mostly covers the IMP part since Windows would need quite a bit more code.

Newer machines use the WIMP system to provide a simple "front end" whereby a user with little training can use the software. Icons (little pictures) are used to represent functions, these being selected with pointers controlled by a mouse. Due to the constraints of such a system, bit mapping of the screen is mandatory. Hence this rather large lump of code.

The code is in two Basic loaders (listing 1 parts 1 and 2). Before I describe how you use the routines, it is best if I indicate the memory usage.

Consider Figure 1:

**Figure 1**

| | |
|---|---|
| \$033C-\$03FB | Work space |
| \$0400-\$07FF | Text buffers |
| \$8B00-\$8B40 | Pointer Sprite |
| \$8C00-\$8FFF | Colour matrix |
| \$9000-\$93FF | Colour buffer |
| \$9400-\$96F8 | Icon library |
| \$9700-\$9FFF | Spare RAM |
| \$A000-\$BFFF | Bit map |
| \$C000-\$CAE3 | Machine code |
| \$CB00-\$CFFF | Character set |
| \$E000-\$FFFF | Bit map buffer |

This shows the memory areas used by the package. When using the package, you are left with about 33K which should be enough for most purposes.

The package provides 21 commands. They are entered via a jump table starting at \$C000 (49152). I shall refer to this address as SA from now on.

## SETUP (SYS SA, INK, PAPER, BORDER

This routine switches on the bit mapped screen and sets the ink, paper and border colours as required. Ink refers to the colour of set points, and paper refers to the colour of unset points. I have adopted high resolution mode with 320 by 200 points and two colours. This gives the most satisfying results. This routine clears the bit map.

## COLSET (SYS SA+3, INK PAPER)

This instruction sets the bit map to the specified colours without clearing the area.

## TURNON (SYS SA+6)

This command simply turns on the bit map whilst leaving the pattern and colour untouched.

## TEXT (SYS SA+9)

This allows you to return to the normal text screen.

## POINT (SYS SA+12, X, Y, FLAG)

This is the first instruction involved with the changing of the screen information. The command acts on the point X,Y according to the value of the flag:

| | |
|---|---|
| Flag = 0 | erase point |
| Flag = 1 | set point |
| Flag = 2 | flip points |

The routine checks the X and Y values. Values greater than the screen range are set to the maximum value on the screen.

## CHANGECOL (SYS SA+15, INK, PAPER)

You may, from time to time, want to change the colours in a particular area. This command does this but leaves the rest of the screen untouched.

## ZONE (SYS SA+18, XS, YS, XF, YF, FLAG)

This command is closely related to POINT in that it is used to change a rectangle of screen according to the FLAG (see command point for the values). The rectangle is defined by its top left corner (XS, YS) and its bottom right corner (XF,YF). The command acts to single pixel resolution and is therefore a little slow.

## CHARS (SYS SA+21, ADDRESS)

The ability to print text on the screen is a crucial part of this package. The designs of the characters used are kept in a block of RAM from \$CB00 to \$CF00. This provides enough space for 256 characters. You can of course, load your own designs to this area. Alternatively, you can copy the 64's character set down using this instruction. The relevant addresses are:

| | |
|---|---|
| Upper case | 53248 |
| Lower case | 55296 |

## TOGGLE (SYS SA+24)

The system used location 1000 to decide whether the colour matrix is to

be updated each time a point is manipulated. This instruction toggles this location. This allows you to alter the design without messing up the colours. It is wise to POKE 1000 with one at the start of your programs to enable colour updating.

## BASICSCREEN (SYS SA+27)

This routine sets up a standard screen design. This has the form of a sheet of paper with a shaded heading zone and a "previous page" icon. The default colours are set to two grey shades.

## HLINE (SYS SA+30, XS, YS, XF, FLAG)

This draws a horizontal line from XS to XF at YS according to the value of the FLAG (see PLOT).

## VLINE (SYS SA+33, XS, YS, YF, FLAG)

This is the vertical analogue to HLINE.

## SHAPE (SYS SA+36, ADDRESS, X, Y, WIDTH, HEIGHT, FLAG, RF)

The main vital aspect of this system is the use of shape tables to generate icons. This command draws a shape stored in RAM starting at the specified address. The top left corner of the drawn shape is placed at X,Y and the shape occupies a square of characters of specified width and height. The flags have the following effects:

FLAG:

0 ..... overlay (erase) current screen contests.
1 .......... EOR shape with screen
2 .......... AND shape with screen
3 ............ OR shape with screen

RF
0 .............. draw normal shape
1 ...... draw shape in reversed field

The shape is stored in the same way as the character table. Consider a design of characters, 3 by 2 in size. is:

ABC
DEF

The character A is defined by eight bytes, as is B etc. These must be stored in sequence in RAM, i.e.

ABCDEF

If you're not sure about redefining characters, take a look at the 64 Programmer's Reference Guide.

## PTEXT (SYS SA+39, TEXT, LINE, TAB, FLAG, RF)

This command prints a line of text on a specified line starting at a specified horizontal offset (TAB). The effects of FLAG and RF are as in SHAPE.

Text can be input as a string or in quotes, the following examples being valid:

```
SYS SA+39,A$,5,5,0,0
SYS SA+39,"HELLO",9,0,1,1
SYS SA+39,"FILE "+FI$+" SCRATCHED",0,0,0,0
```

## ZSHAPE (SYS SA+42, X, Y, WIDTH, HEIGHT, ZF)

This instruction acts on an area of whole characters of specified height and width with its top left corner at X,Y. ZF has the values:

ZF=1 .................. clear zone
ZF=2 .......... reverse field zone

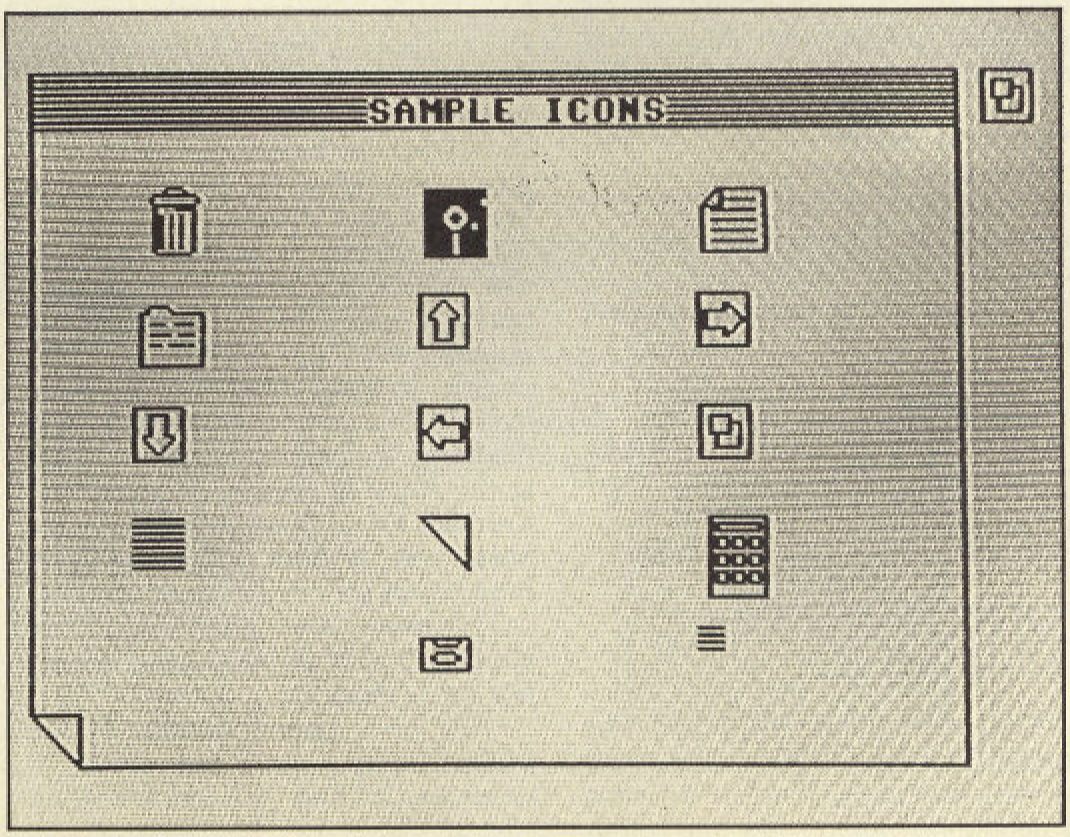
This instruction is useful for highlighting areas and providing non-destructive cursors.

## ICON (SYS SA+45, ICON, NUMBER, X, Y, FLAG, RF)

I felt that it would be handy to provide a resident library of icons. I have therefore provided 13 of the most commonly used. The specified icon is placed with it's top left corner at X,Y in accordance with the flags (see SHAPE). The icons provided are:

0 ........................ Dust bin
1 ..................... Floppy disk
2 .................. Sheet of paper
3 ................. File index card
4 .............. Arrow pointing up
5 ............ Arrow pointing right
6 ............ Arrow pointing down
7 ............. Arrow pointing left
8 .................. Previous page
9 ..... Hatched heading area (large)
10 ...... Bottom folded over corner
11 .................... Calculator
12 ...................... Cassette
13 .... Hatched heating area (small)

Icons 0,1,2,3 and 11 are 3 characters wide by 3 characters high. Icon 13 occupies one icon. The remainder are 2 by 2 in size.



## STOWIT (SYS SA+48)

This instruction copies the current screen (both bit pattern and colours) to two storage buffers. This allows you to keep a default display on hand for use with the "last page" icon.

## GETIT (SYS SA+51)

This is the compliment of STOWIT in that it recalls any screen currently in the storage buffers.

## PRINTMENU (SYS SA+54, TEXT, LINE, TAB, WIDTH, FLAG, RF, INK, PAPER)

The crux of WIMP systems is the use of pull down menus. These comprise of lists of options in the form of a box, from which you can make selections. This option took the most thought since I want it to have maximum flexibility. The text given in the command is printed as a box of specified width with it's top left corner at the specified line and tab position. FLAG and RF have their usual effects and you may set the colours as required to give appropriate contrast from the background.

You should ensure that the text length is an exact multiple of the menu width. If you don't, the command won't crash but your menu may not look quite right. In addition, you must insert all spaces. Consider this simple menu and imagine that all asterisks represent spaces:

```
**DISK*MENU**
CATALOGUE****
VALIDATE*****
SCRATCH*FILE*
```

The text used in the command will be:

```
"**DISK**CATALOGUE****
VALIDATE*****SCRATCH*FILE
*"
```

A width of 13 should be used.

## POINTER (SYS SA+57, COL1, COL2)

This command initialises the pointer. This has the form of an arrow pointing northwest. To give a feeling of depth, the pointer has one colour (COL1) and a shadow (COL2). The command has the action:

1) Turns on the pointer sprite.
2) Puts the pointer at the top left corner of the screen.
3) Turns on the interrupt to drive the pointer.

The pointer is controlled by joystick in port 2. Since the poiner is interrupt driven, it is moved independently of any Basic program. You can, however, monitor the pointer's progress from Basic by PEEKing three locations:

869 . . . . holds the number of the line pointed to
870 holds the number of the column pointed to
868 . . . . . holds the fire button status (0=pressed, 16=not pressed)

## KILL (SYS SA+60)

This disables the pointer. This command is required on occasions such as when accessing disks.

## Examples

Well that's all of them. The important point to appreciate is that this package is deliberately general so that it can be used for the widest possible range of applications. You still have to write the BASIC kernal program. So that you have an idea of how to use the program I've included a simple demonstration in listing 2. This program is by no means optimum and is simply there to show you how the system works and to give a few ideas (so no complaints about the poor structure).

The program is a simple disk aid. The basic screen shows a simple four option menu. This is selected by the pointer with the option currently pointed to highlighted. The last page icon in the top right corner also functions. To choose an option, point at the required option and press fire. You will notice that neither icons nor menu light up until the pointer is on the relevant area.this feature is crucial.

Try using the program, apart from pressing Y or N at one stage, you need just the joystick.

The most important part of the routine occupies lines 110 to 900. In summary, the lines have the following effects:

110: Set up menu limits.
115: Scan fire button and see if pointer is looking at an option or icon.
120: Read current line and column.
130: Check whether pointer is off the menu. If not go to 180.
140: On menu, if currently pointing to an option, go back to 115.
150: Pointing to new option so reverse field last option.
160: Highlight new option and return to 115.
170: Back to 115.
180: Are we pointing to the icon, if so go to 210.
185: If not and we were looking at the icon then de-highlight icon and back to 115.
190: Back to 115.
200: Reset icon.
210: Highlight icon and back to 115
900: This performs the "last page" function.

I've used the flags FL and RF to keep track of whether an option is highlighted or not. Additionally, RF holds the position on the screen of the option in a menu. Since we know the position of the top of the menu, we can easily calculate the number of the option (line 1000 shows this).

The scratch option also uses a copy of this routine but uses a menu based on the array FI$ which is crated by the catalogue subroutine.

The only option which isn't covered by the package is the input of text from the keyboard. This need should not arise too often, but if it should, try listing 3 or something similar.

Given the time, I will write a more structured program which will really show what this package will do.

## Your turn

I finally went to activate your fountain pens. If any of you have any ideas or any problems that you would like covering in the *Reliable Routines* series, drop me a line care of the editor at *Your Commodore* and I'll do my best to oblige.

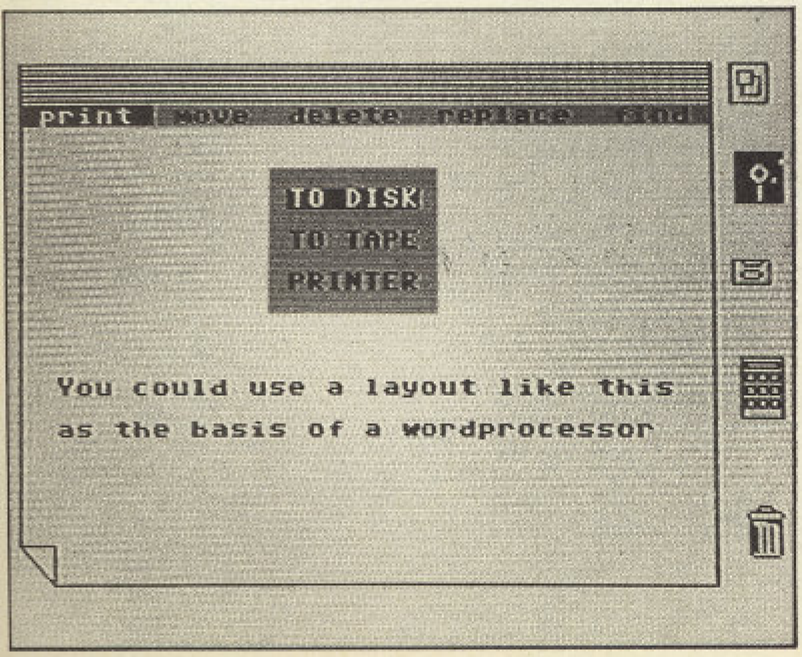
Should you create any programs using these routines that you think may be of interest to other *Your Commodore* readers, please send them into the magazine and we will publish the best ones.

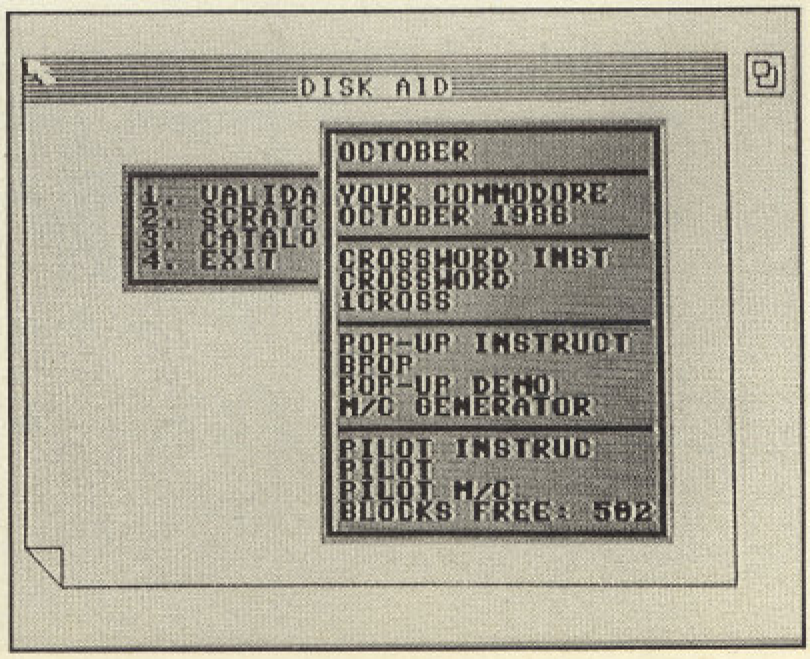
Don't forget we do pay for all submissions published. YC

PROGRAM: LISTING1 PART1

Please read LISTINGS before entering any programs.

```
85  10 REM************************
B6  20 REM* WIMP SYSTEM A+M 1986 *
3D  30 REM*    LOADER 1 PART 1   *
B7  40 REM************************
83  2000 FORL=0TO174:CX=0:FORD=0TO15:READA:CX=CX+A:POKE49152+L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"ERROR IN LINE";2040+(L*10):STOP
0F  2020 NEXTL:END
F2  2040 DATA76,63,192,76,212,192,76,122,192,76,180,192,76,82,193,76,2076
82  2050 DATA165,193,76,105,194,76,26,195,76,115,195,76,122,195,76,153,2038
61  2060 DATA196,76,189,196,76,16,197,76,96,198,76,61,199,76,135,199,2062
DE  2070 DATA76,28,200,76,79,200,76,217,200,76,138,201,76,228,201,32,2104
9C  2080 DATA68,193,141,132,3,32,68,193,141,133,3,32,68,193,141,32,1573
6C  2090 DATA208,169,160,133,169,169,0,133,168,162,64,32,154,192,169,140,2222
DC  2100 DATA133,169,169,0,133,168,173,132,3,10,10,10,10,13,133,3,1269
86  2110 DATA162,8,32,154,192,169,44,141,248,143,173,2,221,9,3,141,1842
21  2120 DATA2,221,173,0,221,41,252,9,1,141,0,221,173,17,208,9,1689
16  2130 DATA32,141,17,208,169,57,141,24,208,96,160,127,145,168,136,16,1845
02  2140 DATA251,72,24,165,168,105,128,133,168,169,0,101,169,133,169,104,2059
F0  2150 DATA202,208,231,96,173,2,221,9,3,141,2,221,173,0,221,41,1944
54  2160 DATA252,9,3,141,0,221,173,17,208,41,223,141,17,208,169,21,1844
56  2170 DATA141,24,208,96,32,68,193,141,132,3,32,68,193,141,133,3,1608
51  2180 DATA76,94,192,32,198,193,32,147,193,32,178,193,165,1,41,254,2021
34  2190 DATA133,1,173,134,3,41,7,141,141,3,56,169,7,237,141,3,1390
26  2200 DATA141,141,3,24,169,1,174,141,3,240,4,10,202,208,252,160,1873
EB  2210 DATA0,174,137,3,240,11,224,2,240,20,17,170,145,170,76,39,1668
F6  2220 DATA193,73,255,49,170,145,170,165,1,9,1,133,1,96,141,160,1762
2E  2230 DATA3,49,170,141,159,3,240,6,173,160,3,76,33,193,173,160,1742
26  2240 DATA3,76,26,193,32,253,174,32,138,173,32,247,183,165,20,164,1911
12  2250 DATA21,96,32,68,193,141,134,3,140,135,3,32,68,193,141,136,1536
0E  2260 DATA3,141,143,3,32,68,193,201,4,144,3,76,131,201,141,137,1621
17  2270 DATA3,32,75,194,173,137,3,201,3,240,14,76,227,192,169,0,1739
5F  2280 DATA6,252,6,251,101,252,133,252,96,32,198,193,32,147,193,32,2176
98  2290 DATA178,193,96,173,143,3,74,74,74,170,32,241,194,24,169,140,1978
DE  2300 DATA101,254,133,254,96,32,68,193,141,132,3,32,68,193,141,133,1974
86  2310 DATA3,96,173,232,3,240,14,173,132,3,10,10,10,10,13,133,1255
D7  2320 DATA3,160,0,145,253,96,173,136,3,74,74,74,141,138,3,173,1646
51  2330 DATA135,3,74,173,134,3,106,74,74,141,139,3,173,136,3,41,1412
D1  2340 DATA7,141,140,3,173,138,3,133,251,169,0,133,252,162,6,32,1743
7A  2350 DATA126,193,202,208,250,165,252,133,171,165,251,133,170,32,126,193,2770
22  2360 DATA32,126,193,24,165,251,101,170,133,170,165,252,101,171,133,171,2358
D6  2370 DATA169,0,133,252,173,139,3,133,251,32,126,193,32,126,193,32,1987
0D  2380 DATA126,193,24,165,251,101,170,133,170,165,252,101,171,133,171,24,2350
58  2390 DATA173,140,3,101,170,133,170,169,0,101,171,133,171,24,169,0,1828
E5  2400 DATA101,170,133,170,169,160,101,171,133,171,96,173,136,3,201,200,2288
66  2410 DATA144,5,169,200,141,136,3,173,135,3,240,12,173,134,3,201,1872
2D  2420 DATA64,144,5,169,63,141,134,3,96,32,68,193,141,150,3,140,1546
F6  2430 DATA151,3,32,68,193,141,152,3,32,68,193,141,153,3,140,154,1627
CA  2440 DATA3,32,68,193,141,155,3,32,68,193,201,4,144,3,76,131,1447
F8  2450 DATA201,141,137,3,173,152,3,141,158,3,238,155,3,238,153,3,1902
F7  2460 DATA173,150,3,172,151,3,141,156,3,140,157,3,173,156,3,174,1758
2D  2470 DATA157,3,141,134,3,142,135,3,173,158,3,141,136,3,141,143,1616
F9  2480 DATA3,32,116,193,24,173,156,3,105,1,141,156,3,173,157,3,1439
2D  2490 DATA105,0,141,157,3,173,156,3,205,153,3,208,207,173,157,3,1847
5B  2500 DATA205,154,3,208,199,238,158,3,173,158,3,205,155,3,208,176,2249
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```
BF  2510 DATA96,169,0,133,253,13
    3,254,224,0,240,16,24,165,25
    3,105,40,2105
A5  2520 DATA133,253,165,254,105
    ,0,133,254,202,208,240,24,16
    5,253,109,139,2637
4A  2530 DATA3,133,253,165,254,1
    05,0,133,254,96,32,68,193,13
    3,251,132,2205
76  2540 DATA252,169,0,133,253,1
    69,203,133,254,160,0,173,14,
    220,41,254,2428
EA  2550 DATA141,14,220,120,165,
    1,41,250,133,1,177,251,145,2
    53,24,165,2101
91  2560 DATA251,105,1,133,251,1
    65,252,105,0,133,252,24,165,
    253,105,1,2196
2C  2570 DATA133,253,165,254,105
    ,0,133,254,165,253,208,222,1
    65,254,201,207,2972
0C  2580 DATA208,216,120,165,1,9
    ,5,133,1,88,173,14,220,9,1,1
    41,1504
69  2590 DATA14,220,96,32,68,193
    ,141,232,3,96,169,11,141,132
    ,3,169,1720
E7  2600 DATA15,141,133,3,141,32
    ,208,169,1,141,232,3,141,137
    ,3,169,1669
03  2610 DATA0,141,171,3,141,72,
    3,32,228,201,32,81,192,169,0
    ,141,1607
58  2620 DATA166,3,169,0,141,152
    ,3,173,166,3,141,150,3,169,2
    ,141,1582
8D  2630 DATA153,3,141,155,3,169
    ,192,133,163,169,149,133,164
    ,32,93,197,2049
BE  2640 DATA24,173,166,3,105,2,
    141,166,3,201,36,208,213,169
    ,0,141,1751
44  2650 DATA150,3,169,23,141,15
    2,3,169,2,141,153,3,141,155,
    3,169,1577
9E  2660 DATA224,133,163,169,149
    ,133,164,32,93,197,169,37,14
    1,150,3,169,2126
A3  2670 DATA0,141,152,3,169,2,1
    41,153,3,141,155,3,169,160,1
    33,163,1688
49  2680 DATA169,149,133,164,32,
    93,197,169,0,141,150,3,141,1
    51,3,169,1864
DC  2690 DATA32,141,153,3,169,1,
    141,154,3,169,16,141,152,3,1
    41,155,1574
98  2700 DATA3,32,148,194,169,16
    ,141,150,3,169,0,141,151,3,1
    69,32,1521
4F  2710 DATA141,153,3,169,1,141
    ,154,3,169,199,141,152,3,141
    ,155,3,1728
0D  2720 DATA32,148,194,169,0,14
    1,150,3,141,153,3,169,0,141,
    154,3,1601
41  2730 DATA141,151,3,169,0,141
    ,152,3,169,183,141,155,3,32,
    148,194,1785
F3  2740 DATA169,32,141,150,3,14
    1,153,3,169,1,141,154,3,141,
    151,3,1555
97  2750 DATA169,0,141,152,3,169
    ,199,141,155,3,32,148,194,16
    9,0,141,1816
69  2760 DATA152,3,141,155,3,141
    ,150,3,141,151,3,169,32,141,
    153,3,1541
0E  2770 DATA169,1,141,154,3,32,
    148,194,96,32,68,193,141,150
    ,3,140,1665
EB  2780 DATA151,3,32,68,193,141
    ,152,3,141,155,3,32,68,193,1
    41,153,1629
CB  2790 DATA3,140,154,3,32,68,1
    93,141,137,3,76,148,194,32,6
    8,193,1585
E1  2800 DATA141,150,3,141,153,3
    ,140,151,3,140,154,3,32,68,1
    93,141,1616
41  2810 DATA152,3,32,68,193,141
    ,155,3,32,68,193,141,137,3,7
    6,148,1545
47  2820 DATA194,173,164,3,141,1
    34,3,169,0,141,135,3,24,14,1
    34,3,1435
F1  2830 DATA46,135,3,14,134,3,4
    6,135,3,14,134,3,46,135,3,17
    3,1027
7D  2840 DATA138,3,24,10,10,10,1
    41,136,3,141,143,3,32,198,19
    3,96,1281
1A  2850 DATA32,68,193,133,163,1
    32,164,32,68,193,141,150,3,3
    2,68,193,1765
F2  2860 DATA141,152,3,32,68,193
    ,141,153,3,24,109,150,3,201,
    41,144,1558
DF  2870 DATA3,76,131,201,32,68,
    193,141,155,3,24,109,152,3,2
    01,26,1518
04  2880 DATA144,3,76,131,201,32
    ,68,193,201,4,144,3,76,131,2
    01,141,1749
5F  2890 DATA160,3,32,68,193,141
    ,171,3,169,0,141,72,3,32,11,
    198,1397
24  2900 DATA14,153,3,14,153,3,1
    4,153,3,169,0,141,149,3,173,
    150,1295
B4  2910 DATA3,172,152,3,141,164
    ,3,140,138,3,32,225,196,160,
    0,165,1697
EB  2920 DATA1,41,254,133,1,173,
    72,3,240,3,76,41,199,32,198,
    197,1664
AC  2930 DATA165,1,9,1,133,1,200
    ,204,153,3,208,227,238,149,3
    ,173,1868
CE  2940 DATA149,3,205,155,3,240
    ,30,24,165,170,105,64,133,17
    0,165,171,1952
CB  2950 DATA105,1,133,171,24,16
    5,163,109,153,3,133,163,165,
    164,105,0,1757
A2  2960 DATA133,164,76,125,197,
    96,173,160,3,240,12,201,1,24
    0,16,201,2038
46  2970 DATA2,240,32,201,3,240,
    18,177,163,32,251,197,76,250
    ,197,177,2256
B5  2980 DATA163,81,170,32,251,1
    97,76,250,197,177,163,49,170
    ,32,251,197,2456
8C  2990 DATA76,250,197,177,163,
    17,170,32,251,197,96,72,173,
    171,3,240,2285
E6  3000 DATA6,104,73,255,76,8,1
    98,104,145,170,96,173,150,3,
    141,156,1858
87  3010 DATA3,173,152,3,141,158
    ,3,169,0,141,168,3,141,167,3
    ,173,1598
2F  3020 DATA156,3,141,139,3,174
    ,158,3,32,241,194,24,169,140
    ,101,254,1932
89  3030 DATA133,254,32,178,193,
    238,156,3,238,167,3,173,167,
    3,205,153,2296
09  3040 DATA3,208,220,238,158,3
    ,238,168,3,173,168,3,205,155
    ,3,240,2186
E4  3050 DATA14,173,150,3,141,15
    6,3,169,0,141,167,3,76,31,19
    8,96,1521
9B  3060 DATA32,253,174,32,158,1
    73,32,166,182,141,82,3,160,0
    ,140,72,1800
62  3070 DATA3,177,34,153,144,5,
    200,204,82,3,208,245,32,68,1
    93,201,1952
3B  3080 DATA25,144,3,76,131,201
    ,141,169,3;32,68,193,141,170
    ,3,24,1524
71  3090 DATA109,82,3,201,41,144
    ,3,76,131,201,32,68,193,141,
    160,3,1588
3F  3100 DATA201,4,144,3,76,131,
    201,32,68,193,141,171,3,201,
    2,144,1715
A5  3110 DATA3,76,131,201,160,0,
    140,166,3,172,166,3,185,144,
    5,32,1587
A4  3120 DATA4,199,133,163,169,0
    ,133,164,6,163,38,164,6,163,
    38,164,1707
1A  3130 DATA6,163,38,164,24,165
    ,164,105,203,133,164,173,169
    ,3,141,152,1967
93  3140 DATA3,173,170,3,141,150
    ,3,169,1,141,153,3,141,155,3
    ,32,1441
9C  3150 DATA93,197,238,166,3,17
    3,166,3,205,82,3,240,6,238,1
    70,3,1986
72  3160 DATA76,185,198,96,201,6
    4,176,5,162,0,76,33,199,201,
    96,176,1944
57  3170 DATA5,162,64,76,33,199,
    201,192,176,5,162,64,76,33,1
    99,162,1809
D8  3180 DATA128,142,73,3,56,237
    ,73,3,96,201,1,240,9,177,170
    ,73,1682
83  3190 DATA255,145,170,76,144,
    197,169,0,145,170,76,144,197
    ,32,68,193,2181
1A  3200 DATA141,150,3,32,68,193
    ,141,152,3,32,68,193,141,96,
    3,24,1440
8B  3210 DATA109,150,3,201,41,14
    4,3,76,131,201,173,96,3,141,
    153,3,1628
0A  3220 DATA32,68,193,141,96,3,
    24,109,152,3,201,26,144,3,76
    ,131,1402
9B  3230 DATA201,173,96,3,141,15
    5,3,32,68,193,201,3,144,3,76
    ,131,1623
D4  3240 DATA201,141,72,3,76,93,
    197,32,68,193,201,14,144,3,7
    6,131,1645
8F  3250 DATA201,168,185,228,199
    ,133,163,185,242,199,133,164
    ,185,0,200,141,2726
E6  3260 DATA153,3,185,14,200,14
    1,155,3,32,68,193,141,150,3,
    24,109,1574
0D  3270 DATA153,3,201,41,144,3,
    76,131,201,32,68,193,141,96,
    3,24,1510
F4  3280 DATA109,155,3,201,26,14
    4,3,76,131,201,173,96,3,141,
    152,3,1617
CB  3290 DATA32,68,193,141,160,3
    ,32,68,193,141,171,3,169,0,1
    41,72,1587
12  3300 DATA3,76,93,197,0,72,14
    4,216,32,64,96,128,160,192,2
    24,0,1697
9A  3310 DATA72,104,148,148,148,
    148,149,149,149,149,149,149,
    149,150,150,150,2261
B0  3320 DATA3,3,3,3,2,2,2,2,2,2
    ,2,3,2,1,3,3,38
E1  3330 DATA3,3,2,2,2,2,2,2,2,3
    ,2,1,169,0,133,163,491
D0  3340 DATA133,164,169,0,133,1
    68,169,160,133,169,169,0,133
    ,170,169,224,2263
8C  3350 DATA133,171,32,133,200,
    169,0,133,163,133,164,169,0,
```

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    133,168,169,2070
46  3360 DATA140,133,169,169,0,1
    33,170,169,144,133,171,32,18
    2,200,96,32,2073
8F  3370 DATA228,201,169,0,133,1
    63,133,164,169,0,133,168,169
    ,224,133,169,2356
16  3380 DATA169,0,133,170,169,1
    60,133,171,32,133,200,169,0,
    133,163,133,2068
46  3390 DATA164,169,0,133,168,1
    69,144,133,169,169,0,133,170
    ,169,140,133,2163
9E  3400 DATA171,32,182,200,96,1
    20,165,1,41,252,133,1,160,0,
    177,168,1899
92  3410 DATA145,170,230,168,208
    ,2,230,169,230,170,208,2,230
    ,171,230,163,2726
65  3420 DATA208,2,230,164,165,1
    63,208,230,165,164,201,32,20
    8,224,165,1,2530
7B  3430 DATA9,3,133,1,88,96,160
    ,0,177,168,145,170,230,168,2
    08,2,1758
6E  3440 DATA230,169,230,170,208
    ,2,230,171,230,163,208,2,230
    ,164,165,163,2735
DA  3450 DATA208,230,165,164,201
    ,4,208,224,96,32,253,174,32,
    158,173,32,2354
72  3460 DATA166,182,141,94,3,16
    0,0,140,72,3,169,147,32,210,
    255,32,1806
87  3470 DATA228,201,177,34,153,
    0,4,200,204,94,3,208,245,32,
    68,193,2044
02  3480 DATA141,93,3,32,68,193,
    141,92,3,32,68,193,141,95,3,
    32,1330
95  3490 DATA68,193,201,4,144,3,
    76,131,201,141,160,3,32,68,1
    93,141,1759
CE  3500 DATA171,3,173,132,3,141
    ,97,3,173,133,3,141,98,3,32,
    68,1374
0E  3510 DATA193,141,132,3,32,68
    ,193,141,133,3,160,0,162,0,1
    40,96,1597
DD  3520 DATA3,160,0,174,96,3,18
    9,0,4,153,144,5,200,232,238,
    96,1697
47  3530 DATA3,204,95,3,208,240,
    173,92,3,141,170,3,173,93,3,
    141,1745
DD  3540 DATA169,3,173,95,3,141,
    82,3,32,180,198,238,93,3,173
    ,96,1682
A2  3550 DATA3,205,94,3,144,203,
    173,97,3,141,132,3,173,98,3,
    141,1616
6B  3560 DATA133,3,96,32,180,192
    ,76,72,178,96,160,0,185,164,
    202,153,1922
21  3570 DATA0,139,200,192,64,20
    8,245,169,44,141,248,143,169
    ,1,141,28,2132
1E  3580 DATA208,32,68,193,141,3
    7,208,32,68,193,141,38,208,1
    69,25,141,1902
06  3590 DATA0,208,169,51,141,1,
    208,169,0,141,16,208,169,1,1
    41,21,1644
B7  3600 DATA208,120,169,246,141
    ,20,3,169,201,141,21,3,88,96
    ,238,0,1864
17  3610 DATA208,208,5,169,1,141
    ,16,208,96,206,0,208,16,5,16
    9,0,1656
6A  3620 DATA141,16,208,96,120,1
    69,49,141,20,3,169,234,141,2
    1,3,88,1619
91  3630 DATA169,0,141,21,208,96
    ,173,0,220,141,147,3,41,15,1
```

```
    41,96,1612
AF  3640 DATA3,56,169,15,237,96,
    3,141,99,3,169,16,141,100,3,
    173,1424
28  3650 DATA147,3,41,16,141,100
    ,3,173,99,3,240,89,201,8,208
    ,6,1478
2F  3660 DATA32,206,201,76,117,2
    02,201,4,208,6,32,217,201,76
    ,117,202,2098
88  3670 DATA201,1,208,6,206,1,2
    08,76,117,202,201,2,208,6,23
    8,1,1882
77  3680 DATA208,76,117,202,201,
    5,208,9,32,217,201,206,1,208
    ,76,117,2084
68  3690 DATA202,201,6,208,9,32,
    217,201,238,1,208,76,117,202
    ,201,9,2128
D7  3700 DATA208,9,32,206,201,20
    6,1,208,76,117,202,201,10,20
    8,6,32,1923
D1  3710 DATA206,201,238,1,208,1
    73,0,208,56,233,24,133,180,1
    73,16,208,2258
FA  3720 DATA233,0,133,181,70,18
    1,102,180,70,181,102,180,70,
    181,102,180,2146
92  3730 DATA165,180,141,102,3,1
    73,1,208,56,233,50,74,74,74,
    141,101,1776
6E  3740 DATA3,76,49,234,16,0,0,
    212,0,0,213,0,0,213,64,0,108
    0
2B  3750 DATA213,192,0,253,64,0,
    13,64,0,3,80,0,3,80,0,0,965
ED  3760 DATA252,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0,252
7B  3770 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
52  3780 DATA0,0,0,255,0,255,0,2
    55,0,255,0,255,0,255,0,255,1
    785
```

**PROGRAM: LISTING1 PART2**

Please read LISTINGS before entering any programs.

```
85  10 REM**********************
    **
B6  20 REM* WIMP SYSTEM A+M 1986
    *
25  30 REM*     LISTING 1 PART2
    *
B7  40 REM**********************
    **
A3  2000 FORL=0TO47:CX=0:FORD=0T
    O15:READA:CX=CX+A:POKE37888+
    L*16+D,A:NEXTD
82  2010 READA:IFA<>CXTHENPRINT"
    ERROR IN LINE";2040+(L*10):S
    TOP
17  2020 NEXTL: POKE 56,138:CLR:
    END
8A  2040 DATA0,0,0,3,4,4,3,2,0,6
    2,65,255,0,0,255,7,660
A4  2050 DATA0,0,0,224,16,16,224
    ,224,2,2,2,2,2,2,2,2,720
FE  2060 DATA0,146,146,146,146,1
    46,146,146,32,32,32,32,32,32
    ,32,32,1278
7A  2070 DATA2,2,2,2,1,0,0,0,146
    ,146,146,0,255,0,0,0,702
54  2080 DATA32,32,32,32,192,0,0
    ,0,0,0,63,63,63,63,63,63,698
1E  2090 DATA0,0,255,255,255,255
    ,255,195,0,0,252,252,252,240
    ,240,252,2958
00  2100 DATA63,63,63,63,63,63,6
```

```
    3,63,129,24,60,24,129,195,25
    5,231,1551
9B  2110 DATA252,252,252,252,156
    ,156,252,252,63,63,63,63,63,
    63,0,0,2202
46  2120 DATA231,231,231,231,231
    ,255,0,0,252,252,252,252,252
    ,252,0,0,2922
6D  2130 DATA0,0,1,2,4,8,16,63,0
    ,0,255,128,128,191,128,128,1
    052
AA  2140 DATA0,0,252,4,4,228,4,4
    ,39,32,32,39,32,32,39,32,773
57  2150 DATA255,0,0,255,0,0,255
    ,0,228,4,4,228,4,4,228,4,146
    9
2E  2160 DATA32,39,32,32,63,0,0,
    0,0,255,0,0,255,0,0,0,708
CF  2170 DATA4,228,4,4,252,0,0,0
    ,0,0,0,7,8,56,32,32,627
40  2180 DATA0,0,0,224,16,15,0,0
    ,0,0,0,0,0,252,4,4,515
D4  2190 DATA39,32,32,39,32,32,3
    9,32,199,0,0,243,0,0,159,0,8
    78
3F  2200 DATA228,4,4,228,4,4,100
    ,4,32,32,32,32,63,0,0,0,767
28  2210 DATA0,0,0,0,255,0,0,0,4
    ,4,4,4,252,0,0,0,523
93  2220 DATA255,128,129,130,132
    ,136,144,156,255,1,129,65,33
    ,17,9,57,1776
F4  2230 DATA132,132,132,132,132
    ,135,128,255,33,33,33,33,33,
    225,1,255,1824
79  2240 DATA255,128,128,128,128
    ,191,160,160,255,1,1,193,161
    ,145,9,5,2048
8F  2250 DATA160,160,191,128,128
    ,128,128,255,5,9,145,161,193
    ,1,1,255,2048
88  2260 DATA255,128,135,132,132
    ,132,132,132,255,1,225,33,33
    ,33,33,33,1824
23  2270 DATA156,144,136,132,130
    ,129,128,255,57,9,17,33,65,1
    29,1,255,1776
11  2280 DATA255,128,128,131,133
    ,137,144,160,255,1,1,1,1,253
    ,5,5,1738
C9  2290 DATA160,144,137,133,131
    ,128,128,255,5,5,253,1,1,1,1
    ,255,1738
A4  2300 DATA255,128,128,159,144
    ,144,144,144,255,1,1,193,65,
    121,73,73,2028
19  2310 DATA159,132,132,132,135
    ,128,128,255,201,9,9,9,249,1
    ,1,255,1935
C0  2320 DATA255,0,255,0,255,0,2
    55,0,255,0,255,0,255,0,255,0
    ,2040
E6  2330 DATA255,0,255,0,255,0,2
    55,0,255,0,255,0,255,0,255,0
    ,2040
84  2340 DATA255,64,32,16,8,4,2,
    1,255,1,1,1,1,1,1,1,644
9F  2350 DATA0,0,0,0,0,0,0,129
    ,65,33,17,9,5,3,1,262
5C  2360 DATA31,16,23,20,23,16,2
    3,20,255,0,255,0,255,0,189,1
    65,1291
C6  2370 DATA248,8,232,40,232,8,
    232,40,20,23,16,23,20,20,23,
    16,1201
4D  2380 DATA165,189,0,189,165,1
    65,189,0,40,232,8,232,40,40,
    232,8,1894
3D  2390 DATA23,20,20,23,16,16,1
    6,31,189,165,165,189,0,0,0,2
    55,1128
69  2400 DATA232,40,40,232,8,8,8
    ,248,0,0,0,255,136,135,128,1
```

```
    35,1605
5E  2410 DATA0,0,0,255,9,241,1,2
    25,152,152,135,128,255,0,0,0
    ,1553
5E  2420 DATA25,25,225,1,255,0,0
    ,0,255,0,255,0,255,0,255,0,1
    551
56  2430 DATA0,0,63,63,63,63,63,
    63,0,0,0,0,0,0,0,0,378
42  2440 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
48  2450 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
56  2460 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
5C  2470 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
6A  2480 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
70  2490 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
7E  2500 DATA0,0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
46  2510 DATA0,0,0,0,0,0,0,0,0,2
    40,16,24,165,253,105,40,843
```

**PROGRAM: LISTING 2**

Please read LISTINGS before entering any programs.

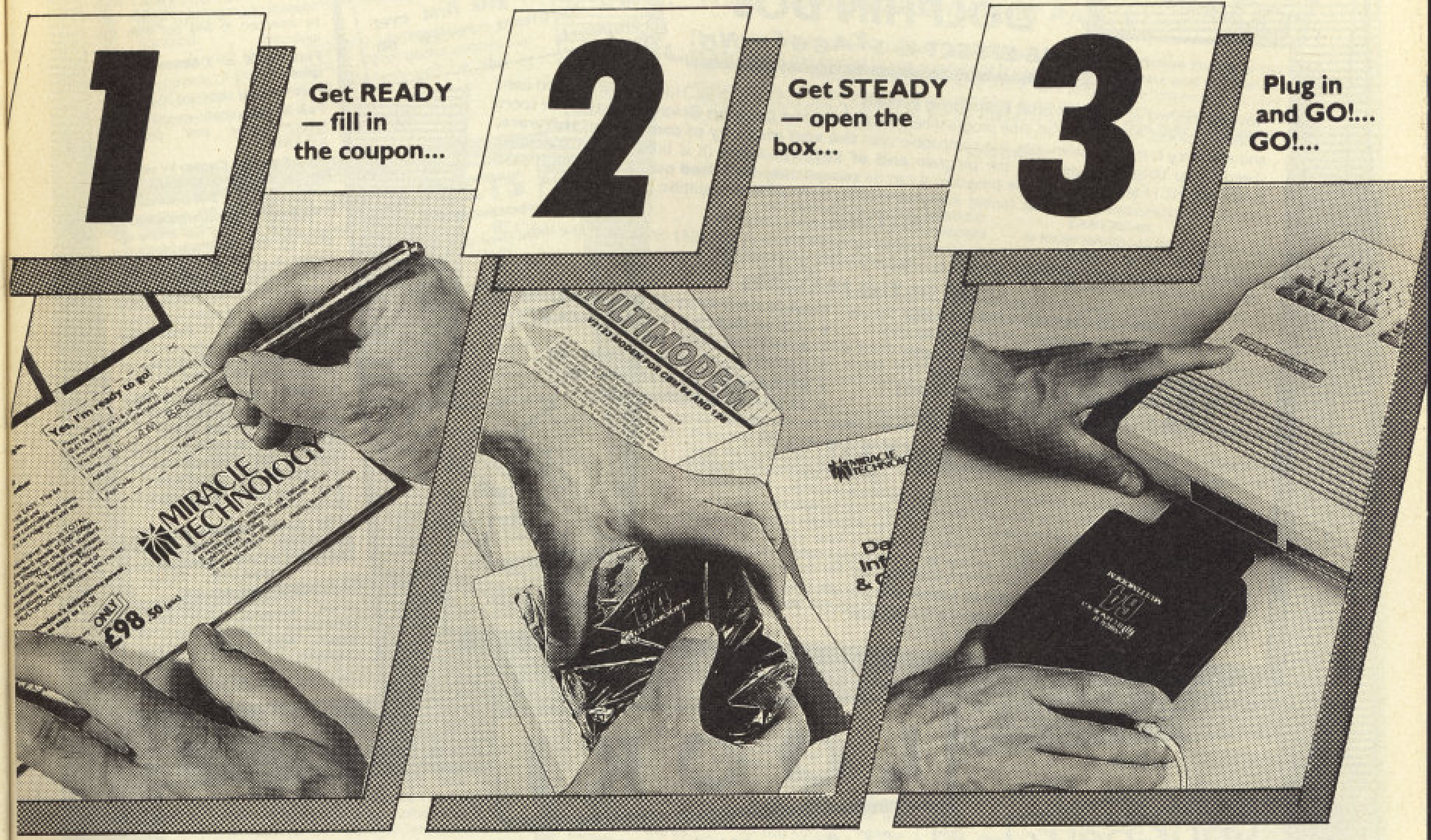
```
71  0 REM**************
76  1 REM* LISTING 2 *
21  2 REM* WIMP DEMO *
D6  3 REM**************
18  5 DIM FI$(30)
A0  10 SA=12*4096
C6  20 SYS SA+21,53248: REM UPPE
    R CASE
51  30 SYS SA+27: REM DEFAULT SC
    REEN
63  40 A$="DISK AID":SYS SA+39,A
    $,1,14,0,0:SYSSA+48
87  50 A$="[CA,S*12,CS]"
DB  60 A$=A$+"[S-]1. VALIDATE [S
    -2]2. SCRATCH  [S-2]3. CATAL
    OGUE[S-2]4. EXIT[SPC5,S-]
AC  70 A$=A$+"[CZ,S*12,CX]"
C2  80 SYS SA+54,A$,5,5,14,0,0,6
    ,14: REM DISPLAY MENU
26  90 SYS SA+48: REM SAVE SCREE
    N
9D  100 SYS SA+57,1,11:POKE868,1
    6: REM TURN ON POINTER
E4  110 XL=5:YL=6:XR=18:YR=9: RO
    W=869: COL=870: SYS SA+15,6,
    14
A1  115 IF PEEK(868)=0 AND ((RF>
    0) OR (FL>0))THEN 900
B3  120 XC=PEEK(COL): YC=PEEK(RO
    W)
ED  130 IF (XC<XL) OR (XC>XR) OR
     (YC<YL) OR (YC>YR) THEN 180
5D  140 IF RF=YC THEN 115
9A  150 IF RF<>0 THEN SYS SA+42,
    XL,RF,14,1,2
E8  160 RF=YC: SYS SA+42,XL,RF,1
    4,1,2
96  170 GOTO 115
5D  180 IF (XC>36) AND (YC>=0) A
    ND (YC<2) THEN 210
87  185 IF FL=1 THEN FL=0: SYS S
    A+15,11,15: SYS SA+42,37,0,2
    ,2,2: SYS SA+15,6,14
FF  190 IF RF=0  THEN 115
F8  200 SYS SA+42,XL,RF,14,1,2:R
    F=0:GOTO115
84  210 IF FL=0 THEN FL=1: SYS S
    A+15,11,15: SYS SA+42,37,0,2
    ,2,2: SYS SA+15,6,14
EC  220 GOTO115
C9  900 IF FL=1 THEN SYS SA+51:
    SYS SA+57,1,11:FL=0:GOTO115
16  1000 ON RF-5 GOTO 1500,2000,
    4000,5000
53  1500 OPEN15,8,15,"V":CLOSE15
    :GOTO6000
59  1999 REM
FE  2000 SYSSA+60:SYSSA+51:RF=0:
    GOSUB 10010
96  2010 SYS SA+15,2,10
77  2015 A$="[CA,S*16,CS]":SYS S
    A+39,A$,3,15,0,0
42  2020 FOR I=1TONF: A$=FI$(I)
7A  2030 IF LEN(A$)<16THENA$=A$+
    " ":GOTO2030
1F  2040 A$="[S-]"+A$+"[S-]"
89  2050 SYS SA+39,A$,3+I,15,0,0
    :NEXT
5C  2060 A$="[CZ,S*16,CX]":SYS S
    A+39,A$,3+I,15,0,0
AD  2070 SYS SA+57,1,11
11  2080 LX=15:LY=5:RX=29:RY=1+I
    : SYS SA+15,2,10
CD  2090 XC=PEEK(COL): YC=PEEK(R
    OW)
1C  2091 IF PEEK(868)=0 AND ((RF
    >0) OR (FL>0))THEN 2200
46  2095 IF (XC<LX) OR (XC>RX) O
    R (YC<LY) OR (YC>RY) THEN 21
    40
3D  2100 IF RF=YC THEN 2090
76  2110 IF RF<>0 THEN SYS SA+42
    ,LX,RF,18,1,2
5C  2120 RF=YC: SYS SA+42,LX,RF,
    18,1,2
F8  2130 GOTO 2090
A5  2140 IF (XC>36) AND (YC>=0)
    AND (YC<2) THEN 2180
D8  2150 IF FL=1 THEN FL=0: SYS
    SA+15,11,15: SYS SA+42,37,0,
    2,2,2: SYS SA+15,2,10
69  2160 IF RF=0  THEN 2090
5E  2170 SYS SA+42,LX,RF,18,1,2:
    RF=0:GOTO2090
EE  2180 IF FL=0 THEN FL=1: SYS
    SA+15,11,15: SYS SA+42,37,0,
    2,2,2: SYS SA+15,2,10
AA  2190 GOTO2090
C9  2200 IF FL=1 THEN 6000
40  2210 F$=FI$(RF-3)
58  2220 SYS SA+27: SYS SA+39,"S
    CRATCH "+F$,3,2,0,0
AF  2230 SYS SA+15,1,2: SYS SA+3
    9,"ARE YOU SURE? (Y/N)",4,2,
    0,0:SYSSA+15,11,15
C5  2240 GET I$:IFI$=""THEN 2240
55  2250 IF I$="N" THEN 6000
48  2260 O$="S0:"+F$:OPEN15,8,15
    ,O$:CLOSE15
BB  2270 SYS SA+39,"FILE SCRATCH
    ED",6,2,0,0
6C  2280 FOR J=1TO3000:NEXT:GOTO
    6000
21  3999 REM
F6  4000 SYSSA+60:SYSSA+51:RF=0:
    GOSUB 10010
34  4010 SYS SA+15,5,13
1F  4015 A$="[CA,S*16,CS]":SYS S
    A+39,A$,3,15,0,0
9A  4020 FOR I=1TONF: A$=FI$(I)
34  4030 IF LEN(A$)<16THENA$=A$+
    " ":GOTO4030
17  4040 A$="[S-]"+A$+"[S-]"
1C  4050 SYS SA+39,A$,3+I,15,0,0
    :NEXT
03  4060 A$="[CZ,S*16,CX]":SYS S
    A+39,A$,3+I,15,0,0
88  4070 SYS SA+57,1,11
D5  4075 XC=PEEK(COL): YC=PEEK(R
    OW)
20  4076 IF PEEK(868)=0 AND (FL>
    0) THEN FL=0:GOTO6000
8D  4080 IF (XC>36) AND (YC>=0)
    AND (YC<2) THEN4110
57  4090 IF FL=1 THEN FL=0: SYS
    SA+15,11,15: SYS SA+42,37,0,
    2,2,2: SYS SA+15,6,14
2D  4100 GOTO4075
88  4110 IF FL=0 THEN FL=1: SYS
    SA+15,11,15: SYS SA+42,37,0,
    2,2,2: SYS SA+15,6,14
29  4120 GOTO4075
15  4999 REM
17  5000 SYS SA+9: SYS SA+60: PR
    INTCHR$(147): END
07  6000 SYS SA+51: SYS SA+57,1,
    11:RF=0:GOTO110
1F  10010 OPEN2,8,15:I=1:FI$(I)=
    ""
E9  10020 OPEN 1,8,0,"$0"
79  10030 GET#1,A$,B$
EB  10040 GET#1,A$,B$
AD  10050 GET#1,A$,B$
D2  10060 C=0
4B  10070 IFA$<>"" THEN C=ASC(A$
    )
5F  10080 IFB$<>"" THEN C=C+ASC(
    B$)*256
EE  10090 BF=C
F5  10100 GET#1,B$:IFST<>0THEN 1
    0180
74  10110 IFB$<>CHR$(34)THEN1010
    0
AA  10120 GET#1,B$:IFB$<>CHR$(34
    ) THEN FI$(I)=FI$(I)+B$ :GOT
    010120
44  10130 GET#1,B$:IFB$=CHR$(32)
     THEN10130
22  10140 C$="":I=I+1:FI$(I)=""
C9  10150 C$=C$+B$:GET#1,B$: IFB
    $<>""THEN10150
F9  10160 IFST=0THEN10040
D0  10170 CLOSE1:CLOSE2:CLOSE15
26  10180 FI$(I)="BLOCKS FREE:"+
    STR$(BF):NF=I
C8  10190 CLOSE1:CLOSE2:CLOSE15:
    RETURN
```

**PROGRAM: LISTING 3**

Please read LISTINGS before entering any programs.

```
D8  1 REM*****************
E0  2 REM*   LISTING 3   *
F5  3 REM*  TEXT INPUT   *
15  4 REM*****************
A0  10 SA=12*4096
2F  20 SYS SA+27: SYS SA+21,5529
    6
5C  30 SYS SA+39,"[SI]NPUT [SF]I
    LENAME:",5,2,0,0
41  40 IN$=""
C0  50 GETI$:IFI$=""THEN50
45  60 A=ASC(I$): IF A=13 THEN 1
    60
0D  70 IF I$=CHR$(20) THEN 110
04  80 IF (A<32)OR((A>127)AND(A<
    160)) THEN 50
A3  90 IF LEN(IN$)<16 THEN IN$=I
    N$+I$:SYS SA+39,IN$,5,18,0,0
12  100 GOTO50
66  110 IF LEN(IN$)<1 THEN 50
A0  120 IN$=LEFT$(IN$,LEN(IN$)-1
    )
72  130 SYS SA+39,"[SPC16]",5,18
    ,0,0
11  140 IF LEN(IN$)>0THENSYS SA+
    39,IN$,5,18,0,0
64  150 GOTO50
94  160 SYS SA+39,"[SI]NPUT TEXT
     WAS: "+IN$,6,2,0,1
```

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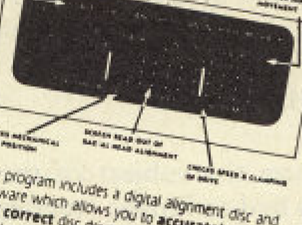
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# Show Stoppers

*For those who didn't manage to get along to the Commodore Show in Manchester, our show report brings you the highlights.*

***By Allen and Margaret Webb***

It was with much anticipation that we took ourselves 20 miles down the motorway to the great metropolis of Manchester to see this year's Commodore Show.

For whatever reason, it was decided that an alternative venue to London was to be used this year. In all, it was a mistake.

Compared to previous shows, this was a rather small and unexciting affair. Having said that, we have nothing but praise for those companies that did choose to attend, for the rest, we simply despair.

The choice of a date so close to the PCW show was probably the main error, but the deliberate choice of the major software houses to only attend the London show sealed the fate of this event. We know that times are tough for the industry but by ignoring the Commodore Show, the industry is simply biting the hand of those that feed it, i.e. Commodore owners and users. It was also particularly hard on those of us who live in the north and who cannot afford the price of attending the shows held in London.

OK, having got that gripe out of the way, here's a rundown of the high-spots of the show.

Overall there were about 50 stands, the centre-piece probably being Commodore's.

## The New Boys

The 64C was very much in evidence, as was the Amiga. This was our first close encounter with the Amiga and we were thoroughly impressed. We had a long chat with David Hill of Commodore who alluded to all sorts of interesting plans without giving any details. There certainly appears to be some special 64C package for Christmas, the only question is will it make the machine attractive enough to sell? We somehow suspect that it won't.

Sadly, there was no indication as to what action was to be taken to make the Amiga more accessible to the home user.

## It's a Gas

Whilst on the subject of the Amiga, Sophus had an Amiga running a transputer via a sidecar. For those of you who haven't met it, the sidecar converts the Amiga into an IBMulator. Since they hadn't got the necessary graphics driver, it wasn't possible to have a flashy demo. Instead, the transputor was quietly calculating the diffusion of a gas in a stagnant room. Not guaranteed to get everyone twitching but impressive enough.

## School Days

The greatest source of noise in the place was the Colleen stand. This company has a number of interesting products most of which are aimed at the educational market. The area of music is well supported by a *Music Compendium* and a *Music Creator*. The compendium seems to be a complete teach yourself system and appeared to be quite comprehensive. The *Music Creator* allows you to write your tune and then converts it into a piece of interrupt driven code. This allows you to use the music in your own programs. The value of the creator has exemplified by a Quilled adventure called *Mystery Voyage*. It was rumoured that a future *Quill* system may well include a patch to this music system. It will be interesting to see if this materialises. A particularly interesting product from Colleen was a variant using Anirog's *Voice Activated Unit*. This allows you to write music by

simply uttering the notes. Due to the noise at the show, the device was not demonstrated but there was a video showing its abilities. It appears that the system, as with all Colleen's range, is aimed at the disabled and as such will be a valuable and cheap aid. We managed to get hold of a preview copy of Colleen's forthcoming educational software. Watch the Education column for our appraisal of it.

## The Hard Stuff

Evesham Micros had the usual hardware goodies on show with a particular emphasis on *Dolphin DOS*. This hardware addition for your disk drive enables significant increases in LOADing and SAVEing speeds. Since the overall performance of the disk is increased, and even fast loaders are handled more quickly. The result is quite phenomenal.

Another hardware specialist company which attended was Trilogic. Trilogic's flagship device is the *Expert Cartridge*. This device uses software from disk rather than on ROM to give a flexible, easily updated, product. Apart from the existing freeze frame and monitor functions, nibblers and a reverse assembler (a disassembler which gives useable source code) are in the pipeline. A new product is the *Scorpion*. This is a device which allows the use of either joystick port for a single stick. A switch on the top of the box allows you to switch the stick to either port or both. We've tried this unit out and it's certainly well made and works well. It's main value is that by eliminating the need to physically move your joystick from one port to the other, it prevents nasty accidents which might blow your interface chip. On the whole, a nice little number. For 128 owners, Trilogic offers a gizmo called *I-CON* which converts RGBI to RGB so allowing you to get 80 columns on TVs. Since not all TVs are suitable, you should talk to Trilogic if you are interested.

## Clubbing

For the real enthusiasts, there was the usual stand from ICPUG (Independent Commodore Products User Group). Using the normal cunning and guile the Club managed to extract our renewal fee from our over burdened bank account. Seriously, though, at only £10, membership is a great investment.

## All Systems Go

System Software had a number of very interesting items. This company specialises in compilers for various languages. The well known *Petspeed* has been extended to the 128 and looks very interesting. A new product is a beast called *Hackpack 128*. This is a collection of toolkit items and includes a RAM-disk facility. A 64 compilation comprising of Pascal and Basic compilers and a toolkit is also on the cards.

## Analytically speaking

The supposed selling point of the 64C is a thing called *GEOS*. First Analytical Ltd, the UK agents for this product, was in attendance. *GEOS*, if you don't know, is a window/icon system providing file handling, a text handler and a graphics pack. It seems quite a nice suite of programs. Spreadsheet and word processor software are scheduled for later this year making the system more attractive to the serious user. *GEOS* is an interesting albeit expensive package which is worthy of a close look. See elsewhere in this issue for a detailed review.

## More from Meedmore

Meedmore (Distribution) had an interesting mix of items. On the one hand, they had a range of hardware from the now defunct STACK Computers. On the other there was also a rather nice mouse driven graphics package called ARTIST. This software was capable of most functions one expects from graphics routines and gave some interesting results.

## On Line

The two main exponents of networking – Compunet and Micronet – were in evidence with special subscription offers. These systems have improved a great deal and offer a wide range of facilities to those who can afford the phone bill (although they make the point that it's not that expensive!).

## Repair Shop

A common source of anguish is the problem of obtaining spares when your machine turns its toes up. HRS Electronics Ltd, which claims to be the sole UK Distributor of CBM spares, were very much in evidence. Certainly, they may be a life saver for those obscure little items.

## Conclusion

So what was our overall impression? Well, the most appropriate word is disappointed. We got the feeling that this was a poorly organised show which made the £3 entrance fee very steep. This impression of shabbiness was enhanced by the poorly produced Official Guide which was a joke to say the least. The use of a venue other than London is a good move but it must receive the same degree of support from the industry as the London based shows – the world does not end at the Watford Gap!

***Touchline***
*Colleen Ltd, 18 Bishop St, Penygraig, Rhonnda. Mid Glamorgan CF40 1PQ.*
*Tel: 0443 435709.*

*Evesham Micros, Bridge St, Evesham, Worcs. WR11 4RY.*
*Tel: 0386 41989*

*ICPUG, 30 Brancaster Rd, Newbury Park, Ilford, Essex 1G2 7EP.*
*Tel: 01 597 1229*

*Meedmore (Distribution) Ltd, 28 Farriers Way, Netherton, Merseyside L30 4XL.*
*Tel: 051 521 2202*

*Sophus, Unit 2C, Newlands High Technology Centre, Inglemire Lane, Hull HU6 7TQ.*
*Tel: 0482 802142*

*Trilogic, 29 Holme Lane, Bradford BD4 0QA.*
*Tel: 0274 684289*

*HRS Electronics Ltd, Electron House, Gt Barr St, B9 4BB.*
*Tel: 021 771 2525.* YC

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# Disk Drive 2000

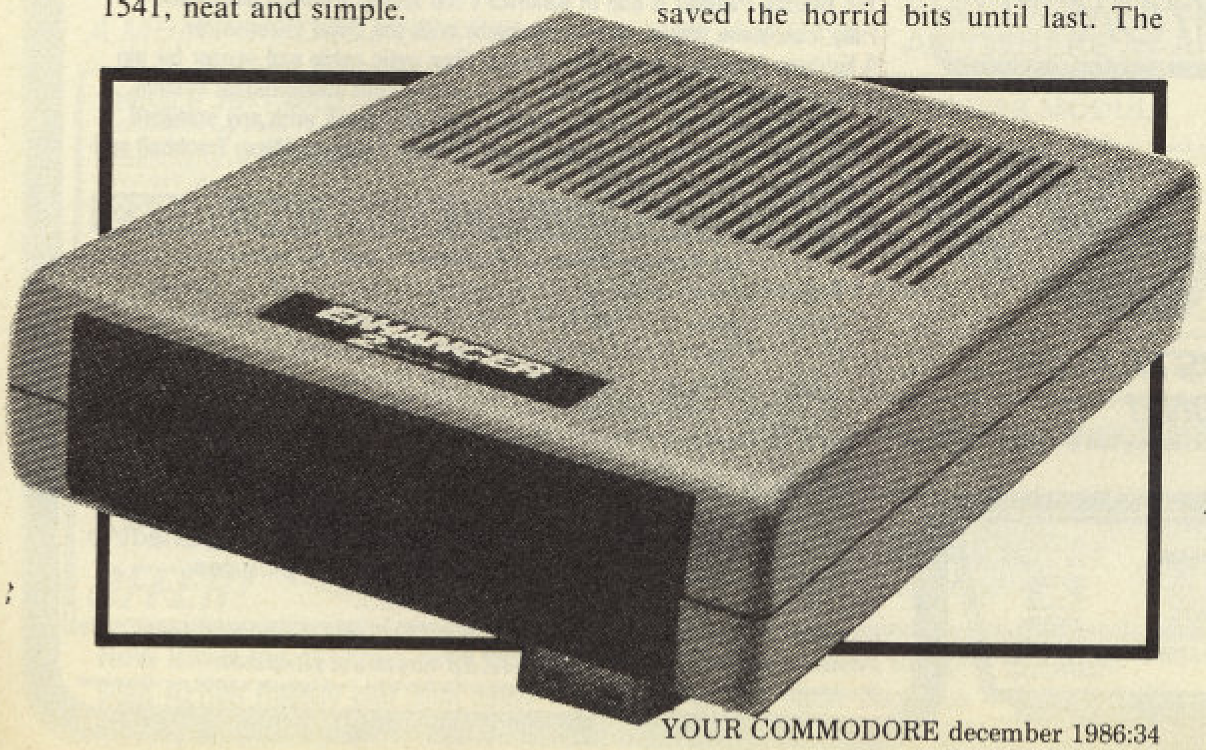
*Fed up of your 1541 disk drive. Firstline Software has brought out an alternative drive for the C64.*

***By Mycroftt Appleby***

With the dramatic un-availability of the 1541 disk drive, and the unreasonable expense of the 1570/1 drive. What alternative for Commodore owners is there except to sell the car? Perhaps the Enhancer 2000 could help you avoid the necessity of such drastic action.

The Enhancer 2000 is a third party (i.e. you didn't make it, neither did Commodore) replacement for the official Commodore 1541 disk drive, with which it is reasonably compatible. Externally it looks like what a 1541 should have looked like if the designer of it hadn't had a headache at the time. It is a slim, half-height unit, and is the same grotty grey as the Commodore 64. The considerable size reduction has been achieved by putting the power supply outside the case in the same way as that of the Commodore 64.

This is a very sensible idea and doesn't clutter up your desk with too many big boxes. The Enchancer 2000 has a footprint of about half that of the 1541, neat and simple.




The connections around the back are the usual two serial sockets and the power in. This is the same type of socket, but the plugs will not go into each other's sockets. Otherwise connecting up is the same as a normal drive.

As far as using the device is concerned, it is operationally identical to the 1541. All the commands are there, even some of the more advanced and lesser used ones in an attempt to improve the compatibility. The manual, however, is a bit disappointing.

If somebody had said that this was possible to produce a worse manual than Commodore I would have had doubts, but now I know that it's true. The Enhancer manual is awful. However, there are a number of Commodore disk drive books on the market and any one of them will suffice.

If this all sounds like money for jam, then I'm sorry because I have saved the horrid bits until last. The Enhancer 2000 is not compatible with most commercial software. Anything with a fast European turbo or some of the more recent American turbos, will not work. Likewise a lot of the more fiendish European copy protections. The American protections are catching up (like Activision), but some of it will still run (like Epyx).

With some software however, it is the case that the program will run, but you cannot make a copy of it.

On the subject of turbos, it is probably worth mentioning that the Enhancer 2000 has its own built in, that increases speed by about 40%-50%. This does mean that other utilities that write to the drive RAM will be negated.

## Conclusion

For £115, the Enhancer 2000 is a good buy. The speed at which the drive works is good, and the styling and reliability is as good as you can get. But incompatibility with a lot (up to 60%) of protected commercial software must be taken into consideration (you should also remember that the 1570/1 is also incompatible with a proportion of commercial software). On the other hand, if you are not going to be using that much commercial software, then I would recommend this peripheral without reservation. YC

***Touch Line***
*Product:* ***Enhancer 2000 (and bundled Word Processor).*** *Price:* ***£148.75 (inc p&p)*** *Company:* ***Firstline Software, 206 Great North Road, Eaton Socon, St Neots, Cambs PE 19 3EF.***

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# Welcome to the Machine

*Get to grips with the C64's mathematical routines.*

***By Allen Webb***

Well it's hello for the last time since this your final dose of machine code (do I hear howls of despair?) in this series. I want to finish off our encounter with the 6510 by considering floating point routines.

In an earlier part I described how floating point values are stored in five bytes. The resident Basic contains a wide range of routines which allow you to manipulate these numbers. The question is, why would you want to use floating point? If you want to write games, you don't need them – floating is too slow! If you want to write programs to manipulate data, you WILL need them.

Table 1 summarises some of the floating point routines available.

**TABLE 1**

| Function | Pointer MSB | Pointer LSB | Entry point |
|---|---|---|---|
| FAC1 ->memory | Y | X | $BBD4 |
| memory ->FAC1 | Y | ACC | $BBA2 |
| memory ->FAC2 | Y | ACC | $BA8C |
| FAC2 ->FAC1 | — | — | $BBFC |
| FAC1 ->FAC2 | — | — | $BCOF |
| FAC1=FAC1+FAC2 | — | — | $B86A |
| FAC1=FAC1+memory | Y | ACC | $B867 |
| FAC1=FAC2-FAC1 | — | — | $B853 |
| FAC1=memory-FAC1 | Y | ACC | $B850 |
| FAC1=FAC1*memory | Y | ACC | $BA28 |
| FAC1=FAC1*FAC2 | — | — | $BA2B |
| FAC1=memory/FAC1 | Y | ACC | $BBOF |
| FAC1=FAC2/FAC1 | — | — | $BB12 |
| FAC1=SIN(FAC1) | — | — | $E26B |
| FAC1=COS(FAC1) | — | — | $E264 |
| FAC1=TAN(FAC1) | — | — | $E2B4 |
| FAC1=ATN(FAC1) | — | — | $E30E |
| FAC1=EXP(FAC1) | — | — | $BFED |
| FAC1=LOG(FAC1) | — | — | $B9EA |
| FAC1=FAC1 ^memory | Y | ACC | $BF78 |
| FAC1=FAC2 ^FAC1 | — | — | $BF7B |
| FAC1=SQR(FAC1) | — | — | $BF71 |
| Random No ->FAC1 | — | — | $EOBE |
| FAC1=FAC1+.5 | — | — | $B849 |
| FAC1=FAC1*10 | — | — | $BAE2 |
| FAC1=FAC1/10 | — | — | $BAFE |

FAC1 is floating point accumulator 1 and FAC2 is floating point accumulator 2. Where the routine involves a floating point value in memory, the start address of the value is held in the indicated registers.

Another important function COMPARES FAC1 to a value held in memory. The address of the value is held in Y/ACC and the entry point is $BC5B. The accumulator returns a value depending on the result of the comparison:

ACC = 0. . .FAC1 = memory
ACC = 1. . .FAC1 > memory
ACC = $FF. .FAC1 < memory

LISTING 1 shows some example routines using two values in memory (N1 and N2).

Lines 40 to 80 show how to load FAC1 with a value. Lines 90 to 160 add two numbers. Lines 170 to 230 multiply two numbers. Lines 240 to 280 extract the square root of a number. Lines 330 to 350 simply print FAC1 on the screen to show that the routines function correctly.

The ROMs also contain a number of handy constants which are readily accessible:

$AEA8 . . . . . . . . . . . . . . . . . . . . . . . . PI
$E2EO . . . . . . . . . . . . . . . . . . . . . . PI/2
$E2E5 . . . . . . . . . . . . . . . . . . . . . . PI*2
$E2EA . . . . . . . . . . . . . . . . . . . . . . 0.25
$BF11 . . . . . . . . . . . . . . . . . . . . . . . 0.5
$BAF9 . . . . . . . . . . . . . . . . . . . . . . . . 10
$B9DB . . . . . . . . . . . . . . . . . . SQRT(2)
$B9D6 . . . . . . . . . . . . . . . . . . SQRT(.5)
$B9DC . . . . . . . . . . . . . . . . . . . . . . . . . 1

LISTING 1

```
40 LOADACC1 LDA #<N1
50 LDY #>N1
60 JSR $BBA2
70 JMP PRINTFLP
80 ;
90 ADD LDA #<N1
100 LDY #>N1
110 JSR $BBA2
120 LDA #<N2
130 LDY #>N2
140 JSR #BA8C ;FAC1=N1+N2
150 JSR $B86A
160 JMP PRINTFLP
165 ;
170 MULT LDA #<N1
180 LDY #>N1
190 JSR $BBA2
200 LDA #<N2
210 LDY #>N2
220 JSR $BA28 ;FAC1=N1*N2
230 JMP PRINTFLP
235 ;
240 AQRT LDA #<N2
250 LDY #>N2
260 JSR $BBA2
270 JSR $BF71 ;FAC=SQR(N2)
280 JMP PRINTFLP
290 ;
300 N1 .BYT $81,$1E,$06,$4A,$9E
; 1.234567
310 N2 .BYT $84,$33,$92,$D1,$29
; 11.223344
320 ;
330 PRINTFLP JSR $BDDD
340 JSR $AB1E
350 RTS
```

These values are quite handy and save you the aggro of creating your own constants. LISTING 2 shows how they can be used:

LISTING 2

```
10 JSR $EOBE
20 JSR $BAE2
30 JSR $BAE2
40 RTS
50 LDA # $A8
60 LDY # $AE
70 JSR $BBA2
80 RTS
```

Lines 10 to 40 load FAC1 with a random number and multiply it by 100. FAC1 therefore holds between zero and 99. The remainder of LISTING 2 loads FAC1 with the value of PI.

From these examples you should see that floating points operations aren't that difficult to use. They are, as I've said before, very slow.

If you try using the random number routine, you'll find it's just as slow in machine code as from Basic.

If you want to generate a random number, there are better ways than by using of floating point routines. First, you can use the value held in the internal clock. This is ideal in Basic, but at machine code speeds, it's no use. The best source of random numbers is the white noise generator in the sound chip. Consider LISTING 3:

LISTING 3

```
10 LDA # $FF
20 STA $D40E
30 STA $D40F
40 LDA # $80
50 STA $D412
60 STA $D418
70 LDA $D41B
80 RTS
```

Lines 10 to 30 set the frequency to the highest possible value. Line 50 selects white noise on voice 3, line 60 turns off the audio output of voice 3. Line 70 extracts a random number based on the amplitude of the waveform in voice 3. I find this method very effective and time independent.

Well that pretty well finished our tour of the ROMs. If you look at a decent disassembly of the ROMs, you will find many other useful routines and will derive many hours of harmless amusement.

You may have wondered why only a fraction of the possible 256 instructions are implemented on the 6510. In fact, it appears that some other codes do have a function. I must warn you that these instructions are unofficial and I cannot guarantee that the codes will function properly but you can try dabbling with them.

First, there are a collection of additional NOPs. You will already know that NOP is a nothing instruction which can be used to leave space in code or refine timing loops. There are in fact one byte, two byte and three byte NOPs.

## One Byte NOPs

The usual instruction used for NOP is $EA. This instruction is also performed by the instructions $1A,$3A,$5A,$7A,$DA,$FA.

## Two Byte NOPs

This instruction is not only ignored but also the following byte. The following bytes perform this function, $80,$04, $14,$34,$44,$54,$64,$74,$F4,$89.

## Three Byte NOPs

This instruction is ignored plus the following two bytes. The relevant instructions are, $0C,$1C,$3C,$5C, $DC,$FC.

The value of these instructions are that they are ignored by normal disassemblers and are therefore useful if you want to make your code difficult to decode. Let us consider a simple example. LISTING 4 prints an asterisk at the current cursor position:

LISTING 4

```
10 LDA # $2A
20 JSR $FFD2
30 RTS
```

Let us insert the bytes $04 and $60 between lines 10 and 20.

LISTING 5

```
10 LDA # $2A
15 .BYTE $04,$60
20 JSR $FFD2
30 RTS
```

The $04 is a two byte NOP so that it is ignored as is the $60 (RTS). This means that the additional bytes are ignored and the routine runs as required. If we try to disassemble this code, however, we get the mess given in LISTING 6:

LISTING 6

```
LDA # $2A
???
RTS
JSR $FFD2
RTS
```

If this is repeated at one or two other places in the code, you can see that the code would become rather tough to decypher.

In TABLE 2, I've listed some other instructions. There are other instructions but I've tried to list the most useful. The validity of these instructions are uncertain since they were derived from the 6502. I'm sure, however, that you'll enjoy dabbling to see if they work on your 64.

TABLE 2

| Op Code | Possible Effect |
|---|---|
| 03 xx | ASL (xx,X) ORA(XX,X) |
| 07 xx | ASL xx ORA xx |
| OF xxxx | ASL xxxx ORA xxxx |
| 13 xx | ASL (XX),Y ORA (XX),Y |
| 17 xx | ASL xx,X ORA xx,X |
| 1F xxxx | ASL xxxx,X ORA xxxx,X |
| A7 xx | LDX xx LDA xx |
| B7 xx | LDX xx,Y LDA xx,Y |
| C7 xx | DEC xx CMP xx |
| D7 xx | DEC xx,X CMP xx,X |
| CF xxxx | DEC xxxx CMP xxxx |
| DF xxxx | DEC xxxx,X CMP xxxx,X |
| DB xxxx | DEC xxxx,Y CMP xxxx,Y |
| A3 xx | LDA (xx),X LDX (xx),X |
| B3 xx | LDA (xx),Y LDX (XX),Y |

Remember, I cannot take responsibility for any problems you may have if you choose to use these codes. They are really more of curiosity value than anything else.

In this series I've tried to show that there is no mystique to machine code. On the contrary, if you've developed tidy programming habits you should find it easy to use. The only nuisance is that unlike high level languages, machine code forces you to develop an understanding of the hardware to get the best results. But that isn't such a bad thing, is it? Anyway, here's wishing you many hours of successful programming.

## Homework

Last month I gave you a choice of homework. Hopefully the more heroic readers will have tackled both. Here are my solutions without any comments (I'll leave it to you to suss them out).

First, a routine to extract the first and last words from an input string. I've used the screen to provide the various text buffers so that you can see it function.

```
40 TEXTSTART = $0400+200
50 TEXTLEN = 830
60 VERBBUFFER = TEXSTART+120
70 VERBLEN = 831
80 NOUNBUFFER = TEXTSTART+200
90 NOUNLEN=832
800 SETUP LDA #32
810 LDY #0
820 LOOP9 STA TEXTSTART,Y
830 STA NOUNBUFFER,Y
840 STA VERBUFFER,Y
850 INY
860 CPY #80
870 BNE LOOP9
880 LDA #0
890 STA NOUNLEN
900 STA VERBLEN
910 ;
1000 TEXTIN LDA #147
1010 JSR $FFD2
1020 LDA #">
1030 JSR $FFD2
1040 LDY #0
1050 LOOP1 JSR $FFCF
1060 CMP #13
1070 BEQ LOOP2
1080 STA TEXTSTART,Y
1090 INY
1100 JMP LOOP1
1110 LOOP2 LDA #0
1120 STA TEXTSTART,Y
1130 STY TEXTLEN
1140 ;
1150 GETVERB LDY #0
1160 LOOP3 LDA TEXSTART,Y
1170 CMP #32
1180 BEQ LOOP4
1190 STA VERBBUFFER,Y
1200 INY
1210 CPY TEXTLEN
1220 BNE LOOP3
1230 LOOP4 STY VERBLEN
1240 CPY TEXTLEN
1250 BEQ LOOP 8
1260 ;
1270 GETNOUN LDY TEXTLEN
1280 LOOP5 LDA TEXTSTART,Y
1290 CMP #32
1300 BEQ LOOP6
1310 DEY
1320 BNE LOOP5
1330 LOOP6 INY
1340 LDX #0
1350 LOOP7 LDA TEXTSTART,Y
1360 STA NOUNBUFFER,X
1370 INX
1380 INY
1390 CPY TEXTLEN
1400 BNE LOOP7
1410 STX NOUNLEN
1420 LOOP8 RTS
```

Second is a simple text compression routine. As a bonus, I've added a decoding routine. The three characters are input in C1,C2 and C3. The encoded data is returned in B1 and B2. If you want to use it, simply assign the alphabet to characters 1 to 26. The remaining 5 characters can be used for punctuation (e.g. ?,!. and space). YC

```
20 C1 = 830
30 C2 = 831
40 C3 = 832
50 B1 = 833
60 B2 = 834
70 ;
80 ;
900 ENCODE ASL CHAR2
910 ASL CHAR2
920 ASL CHAR2
1000 ASL CHAR2
1010 ROL CHAR1
1020 ASL CHAR2
1030 ROL CHAR1
1040 ASL CHAR2
1050 ROL CHAR1
1055 LDA CHAR1
1056 STA B1
1060 ASL CHAR3
1070 LDA CHAR2
1080 ORA CHAR3
1090 STA B2
1100 RTS
1110 ;
2000 DECODE LDA B1
2010 AND #%11111000
2020 LSR A
2030 LSR A
2040 LSR A
2050 STA CHAR1
2060 LDA B2
2070 AND #%00111111
2080 LSR A
2090 STA CHAR3
2100 LDA B1
2110 AND #%00000111
2120 ASL A
2130 ASL A
2140 STA CHAR2
2150 LDA B2
2160 AND #%11000000
2170 LSR A
2180 LSR A
2190 LSR A
2200 LSR A
2210 LSR A
2220 LSR A
2230 ORA CHAR2
2240 STA CHAR2
2250 RTS
```



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# Blow Your Own

*Imagine being able to make your own cartridges for the C64. Until now this has been a preserve of the enthusiast. Now Sircal bring the advantages and convenience of cartridges to the common man.*

***By Mycroft Appleby***

In principal the cartridge is a very simple device. A read only memory (ROM) on a small board that brings the connections of the ROM into an edge connector and a simple plastic case that provides a convenient housing to protect its contents and make sure that the ROM is connected to the computer the right way around.

The difficulty comes when manufacturing the cartridges. To create a masked ROM, you have to physically build in the program at the time when the chip is actually made – ecomonically unsound for numbers less than 20000, and who can guarantee sales of that number in this competitive market? Also the cost of manufacturing a cartridge is many times the cost of duplicating a tape. The old 'uns amongst us will remember the £30-£80 for VCS cartridges 5-10 years ago. Commodore solved their cost problem by manufacturing their own clips – resulting in around £10 for a Commodore cartridge. Nobody else could compete and the cartridge games market as we knew it collapsed for the moment (n.b. Nintendo has sold 80 Million cartridges for the Nintendo machine – but that's another story. . .).

There is another way of making cartridges, and another market to buy them – EPROMs and utilities. An EPROM is similar to an ordinary ROM and is functionally identical as far as the computer is concerned. However it can be programmed after manufacture and erased. The programming and erasure isn't like a normal read/write memory such as a Random Access Memory, but must use a special programmer and eraser. The eraser will wipe the chip in about 20 minutes by shining UV light through a small window in the top of it. Programming is accomplished by plugging it into a programmer which can fill a chip in about 15 minutes.

This programming and erasure cycle can be carried out about 100 times before the chip 'wears out'. The chip will retain its contents for about 100 years before it needs reminding (good enough for most applications I think – unless you have some valuable Victorian software that's about to corrupt).

Utility cartridges are still available, and if you look inside one of them you wil see that they will usually contain EPROMS. They are usually utility cartridges because utilities generally have very small production runs, and EPROMs are suitable for low volume production.

BBC owners are very well versed with EPROMs as the machine has some spare sockets that they just fit into. Commodore owners not so much so. This is mainly due to having to find an EPROM programmer (called a blower), an eraser (called a deprommer), a supply of empty cartridges, and some EPROMs, then trying to find all the necessary software and the skill and information to use it. A daunting task for anybody not completely skilled in the art.

Sircal has a new product aimed at the inexperienced (and more experienced) user in the form of a complete cartridge creating kit. Comprising of a programmer that fits on to the user port of the Commodore 64, a stand alone (i.e. doesn't need to plug into anything except the mains!) deprommer, comprehensive driver software (in cartridge – of course!), and a blank cartridge. The blank cartridge is identical to a normal cartridge except for one or two differences that allow the EPROM inside it to be programmed without taking it out, and a small hole that lets the UV light shine into it to wipe the cartridge when its time is done.

Blank cartridges are a bit expensive at £14 each, but after a while you could always make your own as the chips are only £2 a throw with the empty cartridges at about the same. The cartridges are also only 8K in size and sit in the $8000-$A000 area in memory – reserved for the use of external cartridges whilst keeping Basic alive. 16K cartridges will be made available

if there is enough demand, these sit between $8000 and $C000 and page out Basic for applications that don't need it.

The cartridge can be programmed in two ways – Basic or machine code. The machine code method can be used to make an auto-start cartridge – like a Basic utility or a game. And all the formatting and header codes are up to you. The Basic method has all the hard work done for you and will take a Basic program and put it into the cartridge where it can be instantly recalled for later use. All the header codes and the software needed to re-load the program are written into the cartridge by the operating software – so you don't have to worry about a thing.

The operating software is easy to use, unambiguous, and well explained in the short, but informative manual.

My only gripe is with the eraser. With this you plug the cartridge into it to erase and a small LED shows you when the time is up for erasing (too long reduces the life of the EPROM, too short and it doesn't erase properly). My gripe is that the join between the eraser and the cartridge is not very good and some of the light leaks out. You may think that this is not all that important – but the wavelengths that you need to erase an EPROM can damage your eyes. Sircal say that they think it's safe, but...

There is an interlock which prevents you turning the erase on without the cartridge in place, but I would have preferred something a little better just for piece of mind.

Overall this is a great package for creating cartridges for either your own use or for limited distribution. For a lone enthusiast though, I would recommend getting your own EPROM blowing system where you could just use a standard EPROM and a normal EPROM blower, just because of the relatively high cost of this system. However for a multiple installation such as a school or college. I think that this system is excellent and I'm sure that anyone with that type of installation could think up many ideas for customised machines with easily changeable ROM software. The only bad points are the small size of the cartridges – 8K isn't a lot for a program nowadays. And the inability to change the mapping – so that it can override the operating system for instance, like a lot of disk turbos do. Otherwise a well thought out product.

YC

***Touchline***

*Name:* ***Epilog - 1*** *Price:* ***£144.95*** *Machine* ***C64*** *Supplier:* ***Sircal Instruments (UK) Ltd. 27, Cambourne Rd, Sutton, Surrey, SM2 6RJ*** *Tel:* ***01 644 0981***

# Extended Basic

*We provide a table for all the Commands for last month's FREE Extended Basic*

**B**ecause we presented the instructions for our Free Extended Basic as an article a few of you are having problems sorting out all the different commands. We are therefore pleased to print a table of all of the available commands together with their syntax.

| COMMAND | ACTION |
|---|---|
| RENUMx,y,z | Renumber program.<br>x = start line number (0 for all program)<br>y = increment<br>z = new start number |
| AUTOx,y | Automatic line number generator.<br>x = start line number<br>y = increment<br>RETURN to quite |
| DELx,y | Delete a range of lines<br>x = start line number<br>y = end line number |
| DUMP | Display values of all variables used in a program |
| KEY | Display contents of function keys |
| KEYs,"text" | Program function keys<br>x = key number<br>text = string to be programmed. For a space in the text use shifted space. For an automatic RETURN add a ← to the end of text |
| OFF | Turn OFF function keys |
| OLD | Restore a NEWed program |
| PAUSE | Modify LIST command SHIFT will now pause the listing. |
| TRACE | TRACE program execution<br>Press space for next line or a number to alter speed of trace. |
| TROFF | Turn off TRACE command |
| DIRx | Display disk directory.<br>x = drive number |
| DISK "command | Send a disk command.<br>"command" = standard commodore disk commands |
| DERR | Display any disk errors |
| B-Dx | Binary to decimal conversion.<br>x = a binary number |
| D-Bx | Decimal to Binary conversion<br>x = a decimal number |
| D-Hx | Decimal to Hex conversion<br>x = a decimal number |
| H-Dx | x = a hexadecimal number |
| MERGE "name",dev | Merge program "name" into program alrady in memory<br>dev = device number |
| APP "name",dev | Append program "name" on to the end of program already in memory.<br>dev = device number |
| MLOAD "name",d,1,s | LOAD a program into any area of memory.<br>"name" is the program name<br>d = device number<br>s = start address for LOAD |
| MSAVE "name",d,1,s,e | "name" is the program name<br>d = device number<br>s = start address<br>e = end address +1 |
| MEM | Display memory available |
| HI addr | Set top of memory to addr |

| | |
|---|---|
| **LOaddr** | Set bottom of memory to addr |
| **CODE** | Translate all commodore graphics in program to mnemonics. NB program will not RUN after this command. |
| **QUIT** | Leave the Extended Basic SYS 49152 to restart |

The following table displays the mnemonics that are added to a program after the CODE command.
All codes appear within square brackets.

| | |
|---|---|
| [BLK] | SHIFT + 1 |
| [WHT] | SHIFT + 2 |
| [RED] | SHIFT + 3 |
| [CYN] | SHIFT + 4 |
| [PUR] | SHIFT + 5 |
| [GRN] | SHIFT + 6 |
| [BLU] | SHIFT + 7 |
| [YEL] | SHIFT + 8 |
| [ORG] | CBM + 1 |
| [BRN] | CBM + 2 |
| [L RED] | CBM + 3 |
| [GR1] | CBM + 4 |
| [GR2] | CBM + 5 |
| [L GRN] | CBM + 6 |
| [L BLU] | CBM + 7 |
| [GR3] | CBM + 8 |
| [REV] | REVERSE ON |
| [OFF] | REVERSE OFF |

**Cursor Control**

| | |
|---|---|
| [CR] | CURSOR RIGHT |
| [CL] | CURSOR LEFT |
| [CU] | CURSOR UP |
| [CD] | CURSOR DOWN |
| [HOM] | CURSOR HOME |
| [CLS] | CLEAR SCREEN |

**Function Keys**
[F1], [F2], [F3] etc.

**Control Codes**

| | |
|---|---|
| [CTRL letter] — | CONTROL KEY + letter eg. [CTRLA] |

**Graphics Characters**

| | |
|---|---|
| [G>letter] | SHIFT + letter ('G' means graphic) |
| [G<letter] | CBM + letter |
| [PI] — | PI character |

A number before the code means that you should press the key that many times.
e.g.
[10CD] means press cursor down 10 times.
[15G>S] means press SHIFT + S 15 times.

YC

# Games Reviews

*Your Commodore's trusty team of reviewers has got together the latest batch of software for your delectation.*

## ASTERIX

If you're sick to death of the usual futuristic space battle shoot-em up type of game then this game makes a pleasant change. *Asterix* takes you back over 2000 years to the time of the Romans and the Gauls.

Asterix is the Gauls' hero, or at least he will be if you help him succeed in his task. Asterix with his friends Obelix has to set out and find seven pieces of a missing magic pot. The village druid Getafix needs this pot for making his magic potion to help the Gauls stand against the Romans.

In this arcade adventure Asterix must wander around the countryside battling against wild pigs and Romans. If the boars are beaten they turn themselves into neat carryable hams which are useful for keeping Obelix by your side.

You may find it useful to map your route around the playing area as several paths seem to lead to the same locations. Unfortunately the screens don't move as quick as Asterix so there is quite a pause while the next screen is drawn. Asterix simply hangs in limbo until the program finishes drawing the screen, or perhaps this is when he nips off to the gents.




When fighting with Romans or the boars, a blown up picture of yourself and your opponent appears on the screen. This means that you can see exactly where you are hitting your opponent, or more probably, where he is hitting you.

The action in the fighting sequence is very reminiscent of one of the numerous boxing/kung fu etc. type games. Asterix can punch, duck and kick. Even so it's tricky to prevent him being clobbered over the head by a Roman's staff.

Now Asterix isn't known for being a coward but I must admit that the best strategy I found while playing was simply to hit your opponent once and RUN.

Despite its excellent graphics, *Asterix* has limited lasting interest. For a start all of the pieces of the cauldron appear in the same place, once you've found where they all are and you've mastered the fighting techniques you will find the game extremely dull.

Oh, and there's also a small bug, well quite a big one really, that enables you to collect all the missing pieces of the cauldron within a couple of minutes of starting the game, but I'll leave you to find out what it is.

Superb graphics and music are let down by the actual game. Still if you remember the TV series and the comic strips of Asterix then you may enjoy this game for a while. **J.G.**

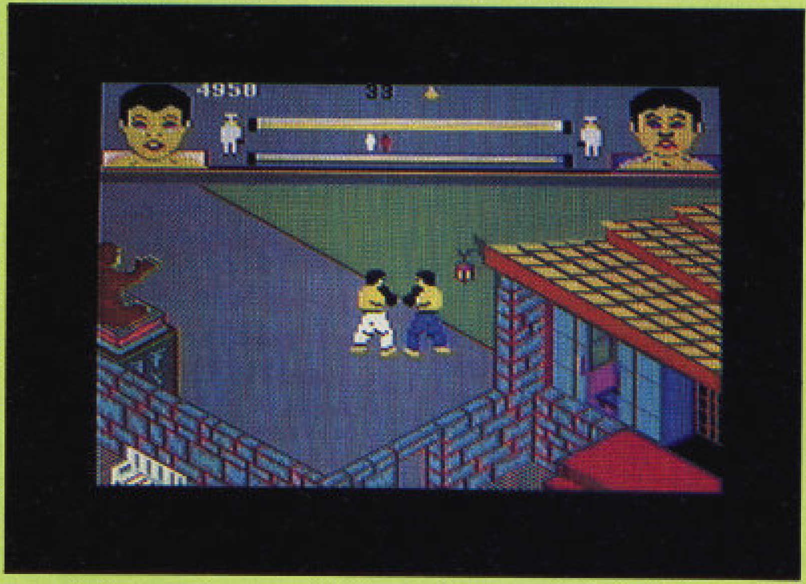
***Touchline***
*Name:* ***Asterix.*** *Machine:* ***C64.*** *Company:* ***Melbourne House, 60, High Street, Hampton Wick, Kingston, Surrey KT1 3DB.*** *Tel:* ***01 943 3911.***
*Originality:* ***8/10.*** *Playability:* ***4/10.*** *Graphics:* ***9/10.*** *Value:* ***5/10.***

## THAI BOXING

Yet another combat simulation on a sport as yet undiscovered by any of the other software houses. The thing that distinguishes *Thai Boxing* from its more normally seen counterpart, is tht not only is it fair game to hit your opponent, you can also kick him. So imagine a fast and furious boxing match with added violence.

Bouts normally take part in a boxing ring, but because these are graphically boring, Anco has provided six different backdrops on a vaguely oriental theme, each one representing an extra level of skill. Unless you own a 128, these screens are loaded in two at a time so make sure that you keep 'play' pressed on your cassette recorder. The high score table can also be saved if you are particularly proud of your achievements.

There are 12 different moves to be mastered. Normal movement of the joystick will move you forward, backwards or make you jump or crouch. Pressing the fire button gives access to a high and low punch, high, low, flying and sweep kicks as well as two defensive manoeuvres in which you can protect your head or your body. The characters, although




fairly small, are well animated. A bout takes place over three one minute rounds, although it can be less if one person runs out of energy. At the end of each round, the players shift position so that you can get a slightly different perspective. There are the usual one or two player options.

There is nothing particularly outstanding about this game but nothing dreadful either. Its appeal though is likely to be limited to fans of combat simulations. G.R.H.

## TOUCHLINE

*Name:* ***Thai Boxing.*** *Company:* ***Anco, 4 Westgate House, Spital Street, Dartford, Kent DA1 2EH.*** *Tel:* ***0322 92513.*** *Price:* ***£7.95 cassette, £9.95 disk.***
*Originality:* ***4/10.*** *Graphics:* ***7/10.*** *Playability:* ***7/10.*** *Value:* ***6/10.***

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## GODS AND HEROES

A couple of months ago, I reviewed a game called *Hercules*, a fiendishly difficult platform game. The main arguments levelled against it by those who (for reasons unknown) didn't like it, were that all too often, you had to leap into the unknown hoping that a platform would mysteriously appear underneath you at the crucial moment. They thought that there was too much trial and error involved as you frequently had no time at all to think. Well, Alpha Omega has just released the sequel called *Gods and Heroes* and it is every bit as good a game as the original with the added bonus that you can now see a lot more on the screen to help you plan your route through each of the 50 chambers. It is still, however, fiendishly difficult.

Continuing the classical theme, the Gods are playing games with the Greek Superheroes. All those tasks of men like Jason and Hercules were no more than assault courses designed to amuse the inhabitants of Olympus. To see how you would fare on the Ancient Greek equivalent of the Krypton Factor, you are invited to try your hand at solving the 50 puzzles that have been set before you.

The object of each screen is to reach a specific item – a club, sword or an axe are typical examples. There are platforms to be leapt on to, mythological monsters to be avoided and ropes to be swung from but be warned, everything is not as it seems. Some platforms burst into flames as soon as you step on them. Ropes crumble at your touch plunging you to your doom. And there are other problems as well. All the superstructures may be a red herring designed to lose you lives. A platform that is initially invisible may lead directly to your desired object. You may have to construct extra platforms out of building blocks.

As well as eight different speed levels to choose from and one or two player options, you can also select which of the 50 screens you want to start from. This is an excellent idea as there are many screens when you know what you want to do but are unable to find a way of doing it. There is nothing worse than being stuck on screen two knowing that there are another 48 as yet unseen. The graphics are not the best in the world but still infinitely better than the original. The balance




between puzzle solving and action is just right and there is a constant feeling of just one more screen. All in all, a great little game, especially for the price. G.R.H.

## TOUCHLINE

*Name:* ***Gods and Heroes.*** *Company:* ***Alpha Omega, 9 Kings Yard, Carpenters Road, London E15 2HD.*** *Tel:* ***01 533 2918.*** *Price:* ***£1.99*** *Machine:* ***C64.***
*Originality:* ***7/10.*** *Graphics:* ***6/10.*** *Playability:* ***9/10.*** *Value:* ***10/10.***

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## SINBAD

As Sinbad, you the hero must break out of your dungeon, recover your treasures and do battle with various nasties, until eventually you meet the vile and evil Sultan, who caused you all this grief in the first place.

On the surface this apears to be just another platform/blast everything that moves type of game. However, underneath lies a very difficult game to master. The game is played over five scenarios, each one needing a password to gain access to it. (Except scenario one and scenario five, which is a continuation of four). This feature I liked. There's nothing worse than, after successfully getting past one difficult screen, you have to do it all again should you die off. Each level has its own particular degree of difficulty.

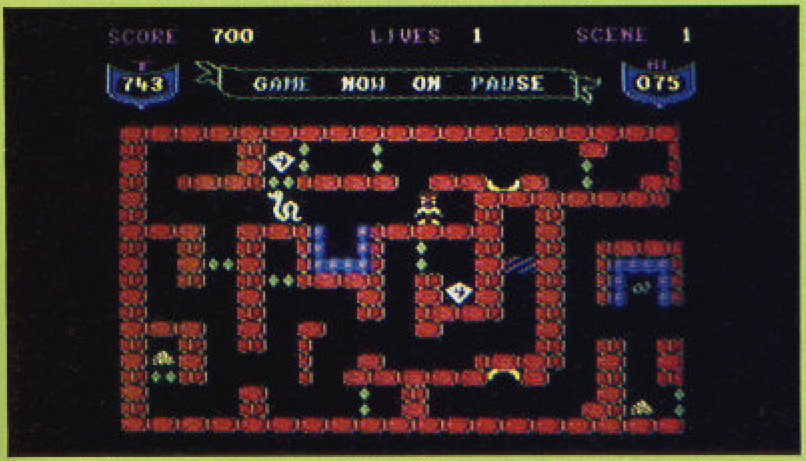
At the start of the game, you have to break out of your dungeon by unlocking two doors with two keys that you obtain. To obtain a key you need to collect eight of your

confiscated treasures. There is no limit to amount of treasures that you can carry, but you are only allowed to carry one key at a time. To hinder you in your task are birds (particularly nasty), snakes and Sinbad lookalikes. If this wasn't enough. There are numerous pulsating walls to navigate. These need split second timing and nimble fingers on the joystick.

Scene two is a straight forward platform scene. (Straight forward did I say?) You have to kill off a certain number of the guards who appear from behind the doors, using a sword which you have miraculously obtained. One hit proves fatal for these guards, whilst you on the other hand can sustain up to four hits before you die. You can recover your lost energy by collecting a golden chalice, these appear at random. However, one guard is a very nasty fellow, one touch from him means instant death for you, and the recovery of a couple of dead guards.

Scene three is perhaps the easiest scene of all, but by no means a walkover. The object here is to guide five of your camels safely across the desert whilst fighting off all sorts of evil flying things. Shooting your own camel will speed him up, but should he be hit by anything else, then watch that timer drop. When firing missiles remember that all the time you have your finger on the fire button, you can guide your bolt to its target. To compensate for this though, you are restricted to the bottom 10 lines of the screen. So accuracy is vital.

Scenes four and five make up one scenario. On four, you have to shoot down the ever-present flying carpets and roc birds. The guards on the carpets take one hit, whilst the birds take three – beware of falling bodies! After a certain number have been disposed of enter the Sultan. Being a nasty type, he transforms himself into a fire breathing dragon and shoots deadly firebolts at you.



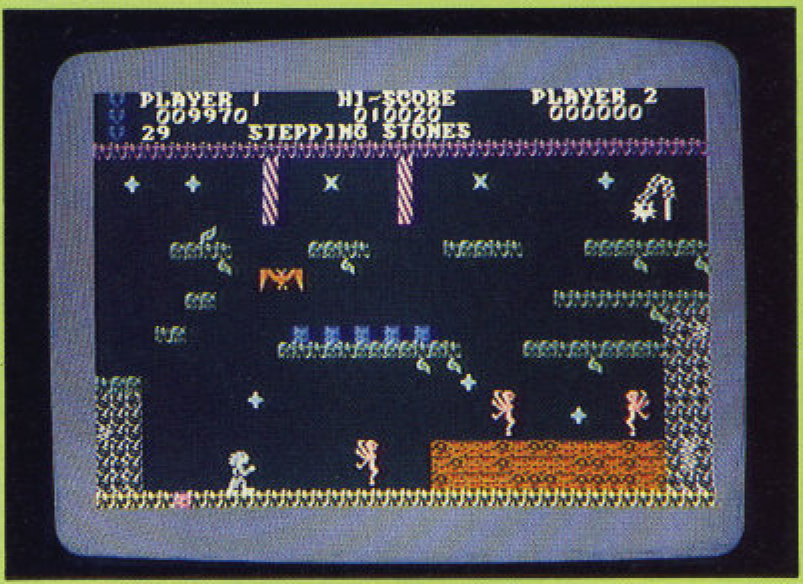

One thing that I must mention. On all the scenes, you not only have the nasties hindering your progress, you also have a timer counting down from 999. (This moves very rapidly, so don't hang around deciding what to do, time is short.

Overall, I liked this game tremendously. Some of the screens seem almost impossible to complete within the given time. But this is the challenge. The graphics are nicely presented, and the music, although not in the Rob Hubbard-Ben Dalglish vein, is pleasant to listen to.

One small criticism is the fact that disk users cannot save out high scores.

## TOUCHLINE

*Name:* ***Sinbad.*** *Company:* ***Superior, Regent Hse, Skinner La, Leeds*** *Price:* ***£6.95.*** *Machine:* ***C64.***
*Originality:* ***6/10.*** *Playability:* ***7/10.*** *Graphics:* ***7/10.*** *Value:* ***8/10.***




## DANTE'S INFERNO

In the ever changing world of computer games, one thing always remains constant. There are a few producers of software that are consistently good. One of these companies is Denton Designs, which is behind Dante's Inferno, so I was therefore waiting eagerly for this program to load in. Sure enough, in a few seconds came the familiar superb loading picture.

When the program did eventually start, I thought to myself; "Oh no, not another Robin of the Wood type Graphic Adventure!" Undaunted, I carried on and to my pleasant surpise I'm glad I did. True, it is in the R of W style, the same type and quality of graphics, but there the similarity ends. For this program is cunningly difficult to master.

For a start, you need to make decisions quickly and accurately. The main objective is to pass through the various realms of hell until you come face to face with Lucifer himself. Aiding and abetting you, or hindering you as the case may be, is a large assortment of nasty evil creatures. Your job is to find objects with which you can bribe these creatures.

The manipulation and use of the objects takes some time to control. Practice whilst still in Limbo. (The first screen) on how to use and manipulate them is advisable. Telling you how to use them would spoil the fun of finding out for yourself. Be prepared to die often at the start, this is very frustrating, but don't let this put you off. Once you have mastered the first few screens you will agree that it was worth persevering with it.

Knowing a little of the story of Dante will undoubtedly help you finish this game.

The playing area is quite large and very well presented. The problems are not easy to solve, but a little intelligent thought will clear the mists for you. There are a total of nine realms for you to pass through before you meet the man himself. Good luck to you. And as they say in all good westerns, I'll see you in Hell.

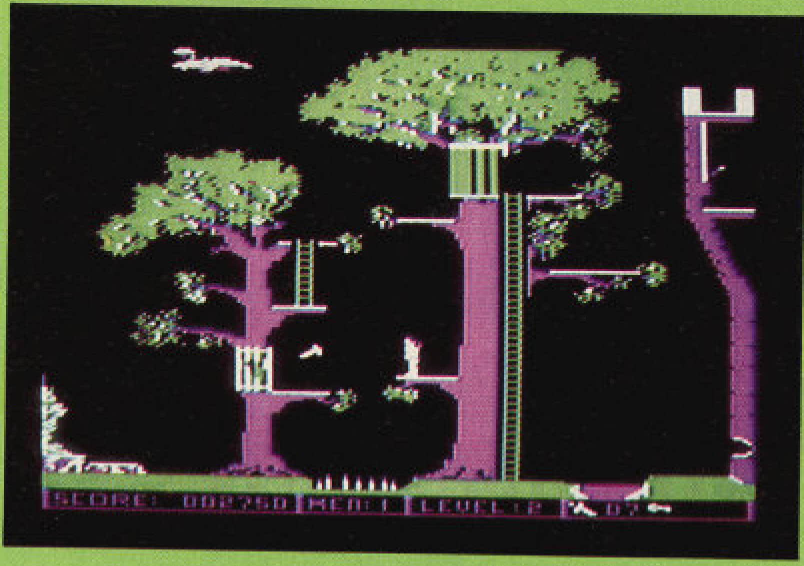
P.E.

## TOUCHLINE

*Name:* ***Dante's Inferno.*** *Company:* ***Beyond, Wellington House, Upper St Martin's Lane, London WC2.*** *Tel:* ***01 379 6755.*** *Price:* ***£9.95.*** *Machine:* ***C64.***
*Originality:* ***7/10,*** *Playability:* ***8/10,*** *Graphics:* ***8/10,*** *Value:* ***8/10.***

## GO FOR GOLD

**M**ultiple event sports games have been around for a long time now and *Go for Gold* is no exception. Originally released as Hesgames a couple of years ago, it got very little attention which is a pity because it is one of the best games of its type ever released. And to be able to buy it for less than three pounds has got to be one of the bargains of the year.



Up to six players can compete against one another with each one getting to select the colour of his or her kit. There are six events to compete in – a complete mixture of skills being required if you are going to win the big G. Your first chance to make a splash is quite literally that, springboard diving. You must time the jumping up and down on the board for maximum effect as well as deciding when to come out of your dive and whether or not you are going to dive forwards or backwards. If you are feeling especially clever, you can nominate the dive that you are going to perform (unike us lesser mortals who just jump and see what happens) and score an extra 10%.

The 100m sprint and 110m hurdles are two very similar events. The former involves you waggling the joystick from left to right as fast as you can whilst the latter is the same with added extra that your joystick should be to the right when you reach a hurdle or else you trip up and get slowed down. The program is equipped to watch out for false starts so you can't cheat as you go for the record.

Hand and eye co-ordination are required if you are to be on target for the next event – archery. Six arrows at four targets of varying distances. You must take wind speed and direction into account and should also try to shoot quickly for the longer you delay, the more tired your arms get and the harder it is to aim properly.

Speed and timing are the essential elements of a successful long jump. You must run as fast as you can towards the board and then time your leap at just the right moment. Even then you can't relax as you must react in time to throw yourself forward on landing in order to gain those precious extra inches.

The final event is weight lifting which is divided into two sections, the snatch and clean and jerk. The power for lifting comes from the thighs and timing is crucial if you are going to get those huge weights above your head. Everything is carefully controlled from your joystick and you get some idea of what's involved for the clean and jerk with these movements, all of which must be timed to perfection. Down, up, down, pause, up, pause, down, up, down (very fast), pause, up. This sequence brings the bar up on to your chest and then powers it upwards as you drop down on to one knee before finally standing upright. Well, that's the theory.

One of the nice things about *Go for Gold* is the little touches. As you increase the weights, so you see the larger weights going on the bar. There is a real feeling of your hands shaking in the archery and the Russian judge in the diving is shortsighted and prefers it if you land in front of him. He is also supposed to be biased if you wear red! You can even get action replays of all the events except archery and so watch your spectacular belly flop over and over again.

This is far and away the best game released under the Americana title so far. From someone whose only exercise is winding his watch up in the morning, all I can do is suggest that you go and get a copy today. **G.R.H.**

### TOUCHLINE

*Name:* ***Go For Gold.*** *Company:* ***US Gold/Americana, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.*** *Tel:* ***021 356 3388.*** *Price:* ***£2.99.*** *Machine:* ***C64.***
*Originality:* ***7/10.*** *Graphics:* ***8/10.*** *Playability:* ***8/10.*** *Value:* ***10/10.***

## CONAN

**W**hen playing games, if I want a good adrenalin pumping hour or so, I play shoot 'em ups. For a really good problem packed adventure I play Infocom. To bring out the ambition and ruthlessness in me it's a good strategy game. But for sheer relaxation and fun then it's got to be the good old platform game. Conan is just that.

As in all platform games you have to collect the odd item or two to help you on your travels, whilst disposing of any nasty creatures that may come your way. OK, so at times, you as Conan may look like blob of white scrambling up your ladders. The odd cloud or two may jerk its way across the screen. The odd hidden character may show through the sprites and scenery, but for all that, this program is enjoyable to play.

The main objective is to find a little green headed man called Volta and dispose of him. Throughout your task, you are helped by a nice little bird that will at times bless you with an extra life. To dispose of the nasties you wield your



magical sword and throw it with all your might. Having succeeded in this, you then catch your sword as it hurtles back into your hands.

The feature which attracted me to this particular game, was that not all the screens were cluttered with platform after platform. The playing areas are quite barren in some scenes The joy and skill, is in finding the correct paths to follow. To this end you are aided by a large flashing arrow showing you where you should end up. (Getting there is the fun). Some of the routes you have to take are quite novel in their approach.

I cannot really say why, but for some reason this game had me going back to it time and time again. One point which many people may find disconcerting is that each screen is loaded in separately from the disk. However, the load is a fairly quick load, so it should not detract too much from the overall enjoyment. P.E.

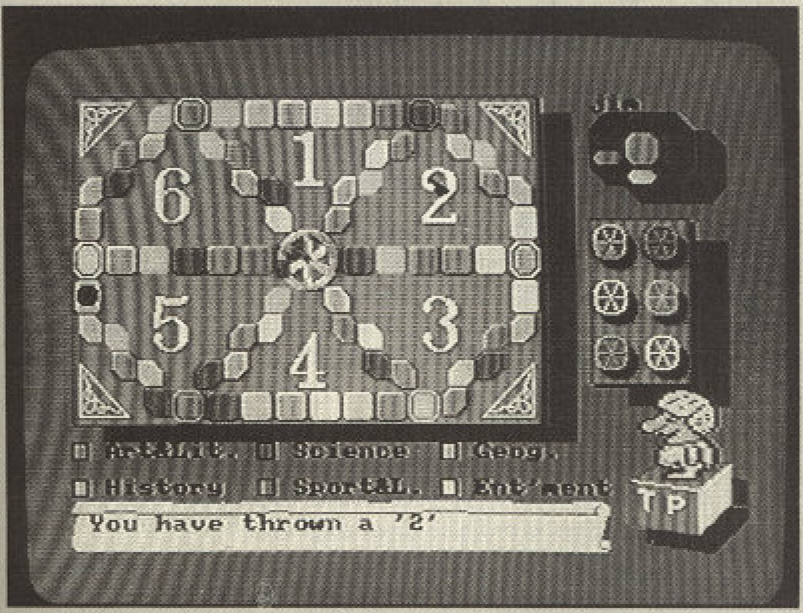
## TOUCHLINE

*Name:* ***Conan.*** *Company:* ***US Gold/Americana, Units 2/3, Holford Way, Holford, Birmingham B6 7AX.*** *Tel:* ***021 356 3388.*** *Price:* ***£2.99.*** *Machine:* ***C64 disk.***
*Originality:* ***5/10.*** *Playability:* ***7/10.*** *Graphics:* ***7/10.*** *Value for Money:* ***8/10.***

## TRIVIAL PURSUIT

Are you one of those people who is full of useless information and revels in giving it to others? If so this is the game for you.

Unless you've been living on a desert island for the last couple of years then you will probably have come across the board version of this computer game.




Personally, I prefer the computer version as it adds a few extra features to the board game. For a start a little character called TP does all the work for you, including throwing a dart at the numbered board so that you don't have to roll a dice. You also have the added dimensions of visual and musical questions. (A point worth bearing in mind is that if you don't have any sound from your computer then you will not be able to hear any of the musical questions.)

Unfortunately, the music produced isn't all that clear and you have to listen very carefully to it. I'm sure that with a little more effort the sound could have been improved dramatically.

The playing area is set up exactly the same as the board game, see the screen shot. The idea is to move around the board answering the questions on the relevant subject. Your go continues until you fail to answer a question correctly. The large sections at the end of the spokes earn you a wedge in the category's colour if you get the question correct. Once your piece is full then its back to the centre where the other players pick the subject for you, answer this correctly and you win the game.

Provided with the game is an extra set of questions, this spare set can be used on any computer that is running *Trivial Pursuit* and more sets will be available at a later date.

If you wish to speed up the game then you can make TP redundant, he doesn't get too upset. This speeds up t he game since TP normaly 'squeaks' out the questions to you quite slowly, turn him off and they apear extremely quickly.

One extremely interesting feature of this game is the ability to have a break down of the questions that you have answered. This tells you which subject you favour, which ones you excel at and more to the point the ones that you haven't a clue about.

A time limit can be set in which the questions must be answered. The maximum time allowed is nine minutes so you don't have to wait until your Uncle Fred grovels in the depths of his brain to find something he read about in 1945.

What makes a great change for this type of trivia game is the fact that you don't have to be good at spelling and type the answers in as the computer expects them. You simply have to tell everyone your answer, press the fire button on the joystick and the correct answer will appear so that you can compare.

One feature that is missing from the game is a SAVE GAME option. This would be extremely useful as games can go on for many hours and it isn't always possible to play through the night.

Some of you may spend a happy fortnight going round and round the board getting nowhere fast but it is great fun finding out what you don't know. Anyway it's far less energetic than outdoor pursuits. J.G.

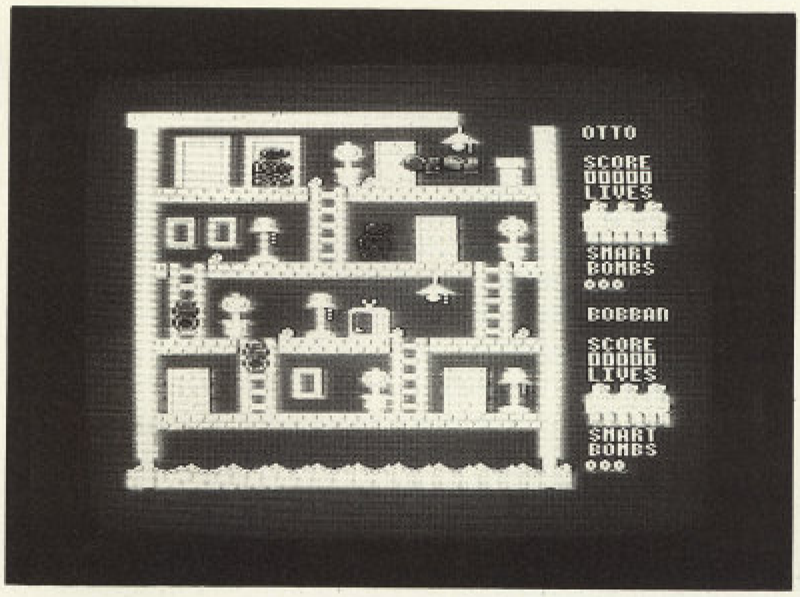
## TOUCHLINE

*Name:* ***Trivial Pursuit.*** *Machine:* ***C64.*** *Price:* ***£14.95***
*Supplier:* ***Domark, 204 Worple Road, Wimbledon, London SW10 8PN.*** *Tel:* ***01 947 5622.***
*Originality:* ***4/10,*** *Playability:* ***9/10,*** *Graphics:* ***8/10,*** *Value:* ***9/10.***

## CLEAN UP TIME

Everything is set for the grand opening of the new hotel in town. Unfortunately, the day before you let the public in, vandals break in and start scattering litter all over the place. As there are no employees present, the owner has no option but to hire two cowboy contract cleaners – Otto and Bobban.

Bribed with the promise of large amounts of money, they go in armed with brooms, guns (for shooting the radioactive vandals!) and smart bombs. Your objective is to sweep up the various bits of rubbish before the vandals can put them back. Succeed and it is on to the next one of eight different levels. There are also two bonus buckets to be collected on each level as well as a time related bonus.




*Clean Up Time* can be played as either a one or two player game. If you select the two player option, then you can decide to play either as a team or competitors. As you score bonus points for killing the other person, it is not too difficult to see what more people will do, claiming that it was an accident. The problem with this is that at the start of each level, the two cleaners come out of their respective rooms at the top of the screen which just happen to be right next to each other so that one player can put a bullet in the other's back before he even blinks.

This is a simple game to play with not too much to recommend it but with nothing too bad about it either.

G.R.H.

## TOUCHLINE

*Name:* ***Clean Up Time.*** *Company:* ***Players, Mercury House, Calleva Park Industrial Estate, Aldermaston, Berks.*** *Price:* ***£2.99.*** *Machine:* ***C64.***
*Originality:* ***4/10.*** *Graphics:* ***6/10.*** *Playability:* ***7/10.*** *Value:* ***6/10.***

## JACK THE NIPPER

Every kid, and some grown ups, wants to do naughty and bad things and get away with it. This game lets you do just that.

As Jack, you are let loose upon an unsuspecting public and you cause havoc wherever you go. The more havoc you can create, the more your rating goes up.

The basic idea is that you go around the town and pick up objects that will assist you in your dirty deeds. Having secure an object, you then have to decide in what way it can be best used. This aspect of the game brings all your skills as a Dennis the Mennis into play. Use an object in one place, and your Naughtyometer will hardly budge, but used in the best place – up it goes.

Movement is by the standard left/right and fire button space. To pick an object up – you may carry only two – you press the one or two key accordingly. (That is to say if you press the two key first, then the object you pick up is placed into pocket two. To use it you press two again.) To go through a door, you press Return.

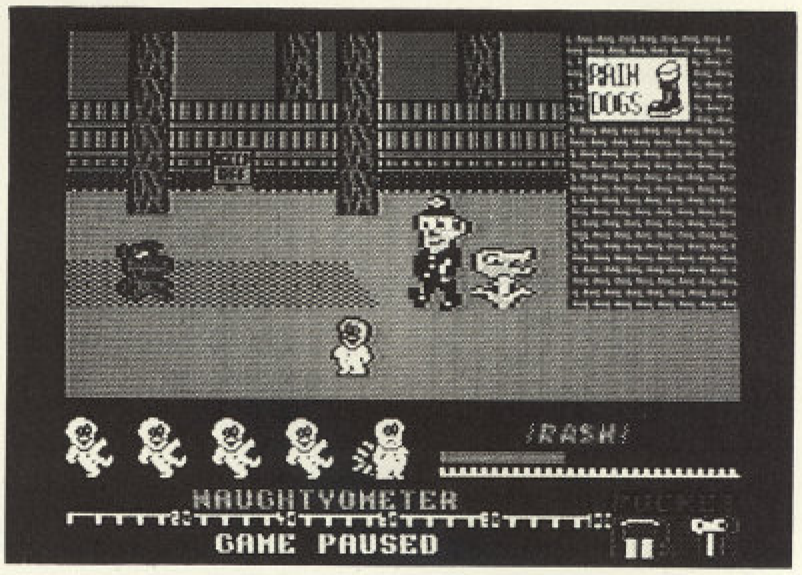
Exploring the town can be quite funny, as usual though, you have to avoid anything else that moves. Coming into contact with any moving object gets you spanked. After a certain number of spankings you loose one life.

The game present some nice touches, with a couple of nice sound tracks. All in all a fairly novel, humorous and pleasant game.

P.E.

## TOUCHLINE

*Name:* ***Jack the Nipper.*** *Company:* ***Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4PS.*** *Tel:* ***0742 753423.*** *Price:* ***£6.95.*** *Machine:* ***C64.***
*Originality:* ***7/10.*** *Graphics:* ***6/10.*** *Playability:* ***6/10.*** *Value for Money:* ***7/10.***




## AFTERMATH

Everyone likes a good shoot 'em up – and I'm no exception. The adrenalin builds up as you get further and further into the battle. Unfortunately, Aftermath could not even get me slightly excited.

The main object of the game is to fight your way through wave after wave of alien craft until you reach the enemy's stronghold. Having reached this far, one strategically placed bomb makes you the master.

I have to be honest though and admit that I did not get this far into the game. The main reason being that I turned off my machine. The playing area consists of a continously dowward scrolling patch of greenery, dotted with grey square to represent the buildings of the enemy.

Having got past the first wave, you immediately get the second one and so on and so on. Unless you miss the slight pause between each wave, you would not know that you had successsfully negotiated the previous one.

To add to all the excitement, you have a continuous flicker on screen where the interrupt occurs, this somewhat detracts your attention from the job at hand.

I do not normally criticise a program in such a strong way (I always think of the hard work and effort that the programmer puts in) but in my opinion, and please remember, this is only MY opinion, this game is a very poor Black-Hawk.

G.R.H.

## TOUCHLINE

*Name:* ***Aftermath.*** *Company:* ***Alpha/Omega, CRL, 9 Kings Yd, Carpenters Road, London E15.*** *Price:* ***£1.99*** *Machine:* ***C64.*** *Originality:* ***3/10.*** *Playability:* ***2/10*** *Graphics:* ***3/10*** *Value* ***4/10.***

YC

## TWO ON TWO

A logical title for the successor to One on One, Two on Two is a one or two player basketball simulation in which you play either singly or as a team against the computer or as opponents with the computer controlling one player on each side.

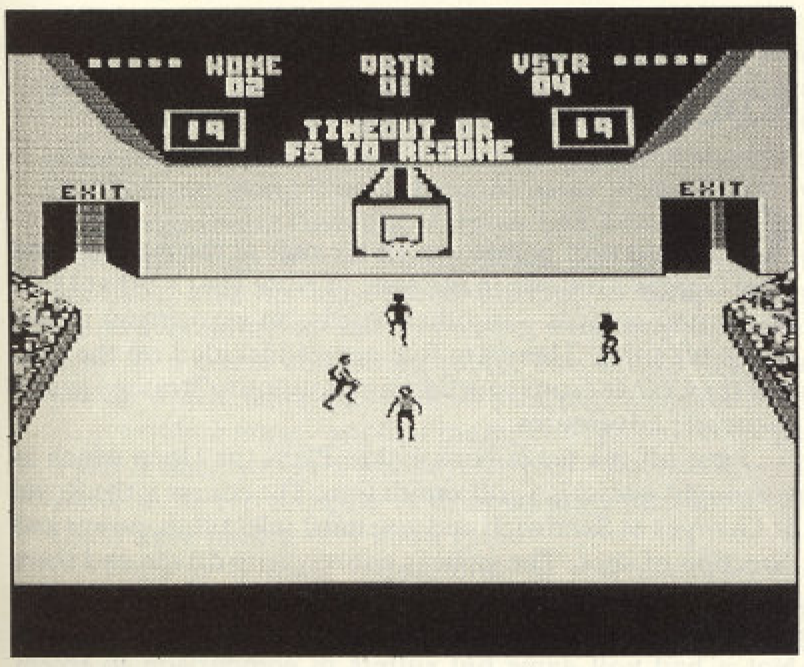
Before you actually start playing, there are a huge number of options ranging from practice mode to choosing the abilities of your player (dribbling and jumping skills, shooting accuracy etc). You can choose to play in a one off exhibition match or take place in a league.

The game itself is divided into four quarters. First one side attacks and then the other. Although you can steal the ball, you have to wait for the other part of the pitch to be drawn before proceeding so that there are no quick break-aways. Success in the game depends on your shooting and passing abilities. A quick press of the joystick throws the ball to your team-mate or asks him to do the same to you whilst a longer press makes your man jump and you should aim to release the ball towards the basket right at the top of the leap.

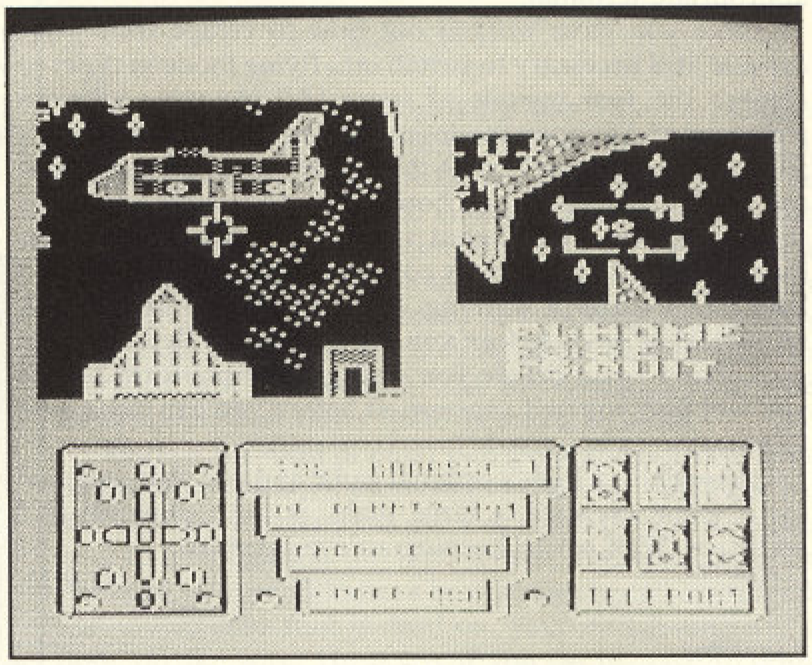
Your computer controlled team-mate plays a semi-intelligent sort of game, trying to find space and scoring opportunities as he sees fit, but he doesn't always do what you think he ought to. If this is really annoying you, you can start to call the plays and tell your man to patrol a specified zone on the court.

The animation of the players is well done although the rest of the graphics are nothing special. The main problem with the game is that basketball is very much a minority sport over here and with the game being fairly expensive and disk only, is likely to remain that way. For true fans only.

**G.R.H.**




***Touchline***
*Name:* ***Two on Two Basketbnall.*** *Company:* ***Activision, 23 Pond St, Hampstead, London NW3 2PN.*** *Tel:* ***01 431 1101.***
*Price:* ***£14.99.*** *Machine:* ***C64.***
*Originality:* ***5/10.*** *Graphics:* ***7/10.*** *Playability:* ***7/10.*** *Value:* ***6/10.***



## HOPELESS

Some people really get upset when they lose their girlfriends. One such person is Al 'Dutch Meat' Bluntz. Al was just a plain, ordinary former interplanetary sportsman and bartender until the day that Manic Monk kidnapped his loved one. MM is the greatest criminal brain in the whole universe and he has taken the voluptuous Jane to a part of the galaxy unknown to the rest of mankind – New Almere. Big Al decides to go and rescue her and so hi-jacks a space shuttle in order to get himself to the outskirts of MM's nerve centre.

The first thing to say about the game is that it is huge – a massive arcade adventure cum platform game cum strategy game set over 2000 screens. You only get some idea of how big it is when you log on to one of the terminals giving you access to a map of the area full of weird and wonderful structures to be explored. Correct use of terminals is essential if you are to rescue your young lady and there are 10 different sorts for you to log on. These range from ordinary viewers to teleport systems. There are various two and four-way switches to be manipulated and top up stations for your strength, energy and fuel supplies. The most important though are the heart terminals. These open previously locked doors which allow access towards the huge heart where MM has made a love nest for the unwilling Jane. There are 14 hearts to be deactivated as well as some duds.

Al starts off in his space ship and his first problem is getting out. There are only three rooms but they are full of assorted nasties and energy barriers to be overcome. Naturally, Al has taken the trouble to arm himself and has three different weapon systems available. The energy shield forms a barrier all round our intrepid hero, killing all that it touches but it does require considerable amounts of – surprise, surprise – energy. Your laser is a more effective distance weapon but gulps fuel. Finally, there is the good old fashioned Karate kick which again uses energy and can only be used when you are running. Personal damage reduces

strength but all three of these levels can be topped up at the appropriate terminal.

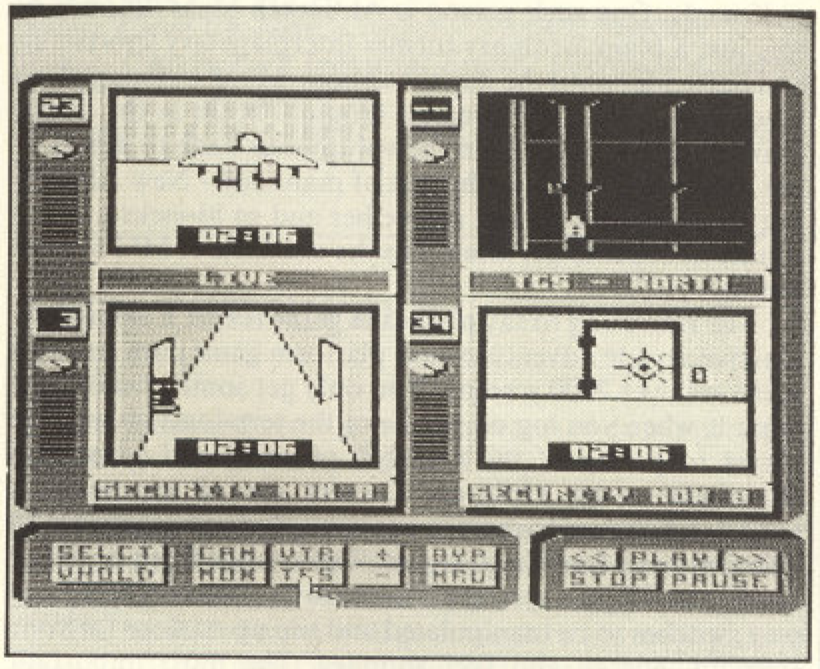
Once you have worked out how to escape from your capsule, it is necessary to switch into flying mode in order to explore the vast regions of space. All changing between transport and weapon modes is done by selecting the correct icon via the function keys. A teleport terminal is a useful first one to find as it saves you both time and trouble as you fly through space. You cannot teleport directly into another building but there are many convenient platforms for you to land on. A word of warning. It is necessary to switch back into walking mode before you use a terminal. Remember to start flying again before you walk off the platform or else you will find yourself vapourised before you can say Alpha Centaurii.

Hopeless is a highly original game and one that, unusual for a game on such a large scale, is both playable and addictive. Well worth keeping an eye open for.

G.R.H.

***Touchline***

*Name:* ***Hopeless*** *Company:* ***Radarsoft/Ariolasoft, 68 Long Acre, Covent Garden, London WC2.*** *Tel:* ***01 836 3411.***
*Price:* *Machine:* ***C64.***
*Originality:* ***8/10.*** *Graphics:* ***7/10.*** *Playability:* ***8/10.*** *Value:* ***9/10.***




## HACKER II

After your success in breaking into the system in the original Hacker, the Government of the USA now looks on you as being some sort of specialist in the field. One day whilst quietly perusing the Activision Bulletin Board, your activities are interrupted by an on screen message from the CIA. This invites you to go off in search of the Doomsday Papers which are reported to be hidden in a secret Siberian base. The contents of these papers if released, would end Western civilisation as we know it.

As might be expected, the papers are protected by a complex security screen and you will have to penetrate it if you want to get away with your mission. The defences consist of a series of cameras and guards and to outwit them, you have a device known as Multi-function Switching Matrix. This is a combination of four screens which can be tuned in to monitor some of the 38 cameras. This is coupled with a video from which you can record various bits and then use the tapes to bypass a specific camera with your recording. This requires some considerable editing skills as everything has to be perfectly synchronised.

You also start off with three Mobile Remote Units which you will use to actually get the papers when you find them providing you can avoid the Annihilator – a little beast that the Russians can call upon with the sole objective of destroying the MRUs.

The presentation of Hacker II is phenomenal and you can spend hours just playing with your machine, tuning in your monitors and switching from screen to screen. The instructions come in the form of an operating manual which is somewhat verbose and requires considerable study. I have considerable reservations about the game itself though. I suspect that it will be the sort of title that you show to your friends in order to demonstrate how clever you and the machine are, but will seldom go back and actually play.

G.R.H.

***Touchline***

*Name:* ***Hacker II.*** *Company:* ***Activision, 23 Pond St, Hampstead, London NW3 2PN.*** *Tel:* ***01 431 1101.*** *Price:* ***£9.99 cassette, £14.99 disk.*** *Machine:* ***C64.***
*Originality:* ***10/10.*** *Graphics:* ***8/10.*** *Playability:* ***5/10.*** *Value:* ***6/10.***

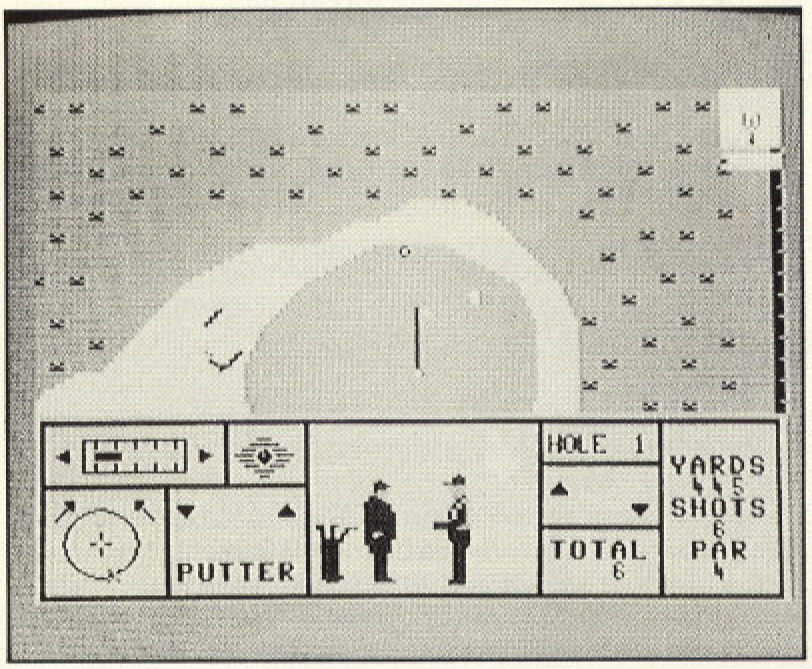
## NOW GAMES 3

Collections of games are all the rage at the moment and Now Games 3 follows in the style of Now That's What I Call Music pop records – in other words, an assortment of last year's hit titles. There are five games included on the tape and they range from sporting simulations to strategy games to arcade adventures.

First off the tee is Nick Faldo Plays the Open which as you might guess, is a golf simulation. The course is the Royal St Georges at Sandwich and you must select club, power and direction of shot. The game is entirely icon driven and there are added features such as the caddy questioning your choice if he thinks that you are wildly out in the club that you pick. Not a bad golf game but suffers in comparison to recent releases such as Leaderboard and Golf Construction set.

Sorcery is an arcade adventure in which you play a wizard trying to defeat the forces of evil. As you fly around the various locations, so you find objects which must be manipulated correctly in order to allow access to other areas of the game. Collisions with monsters deplete your energy and you must also complete your task of placing a specific item on the altar at Stonehenge before your time limit expires.

Code Name Mat II sees you as Captain of Centurion II trying to protect the energy rich satellites of the Planet Vesta. Your ship is equipped with various scanners, weapon systems and warp drives and you must decide how best to deploy your forces as you attempt to destroy the invading fleet of Myon craft. An interesting mix of strategy, flight simulation and combat action.




The final program on side one of the tape is another arcade adventure – Everyone's a Wally starring Wally Week and the rest of his family. Your objective is to collect the assorted parts of the code that let you into the safe and so pay your wages. Different members of the family have different abilities and you need to swap between them as you explore the somewhat unusual town where they live. All this whilst avoiding tripping over the baby and other assorted hazards.

There is only one game on side two but it is in three separate parts. A View to a Kill is an arcade adventure based on the James Bond film of the same name. Part one involves a car chase round Paris and is shown as a 3-D maze together with a plan view of your surroundings. The second part sees our hero and his lady friend attempt to escape from a burning building in San Francisco, collecting such useful items as a geiger counter en route. This is used in the final part in which James has to defuse the nuclear bomb hidden deep within a mine – another maze. You can only enter parts 2 and 3 when you earn a code from part 1 but this shouldn't prove to be too difficult. A disappointing attempt at what could have been a very good game.

There is nothing outstanding in this package which makes you think that you ought to buy the tape straight away but none of the games are really bad either. Probably only worth considering if you don't already own any of the titles. If you have seen one or two before, then there are plenty of other collections to consider.

G.R.H.

*Touchline*
*Name: **Now Games 3.** Company: **Virgin, 2-4 Vernon Yard, Portobello Road, London W11 2DX.** Tel: **01 727 8070.** Price: **£9.95.** Machine: **C64.***
*Value: **7/10.***

## PUB GAMES

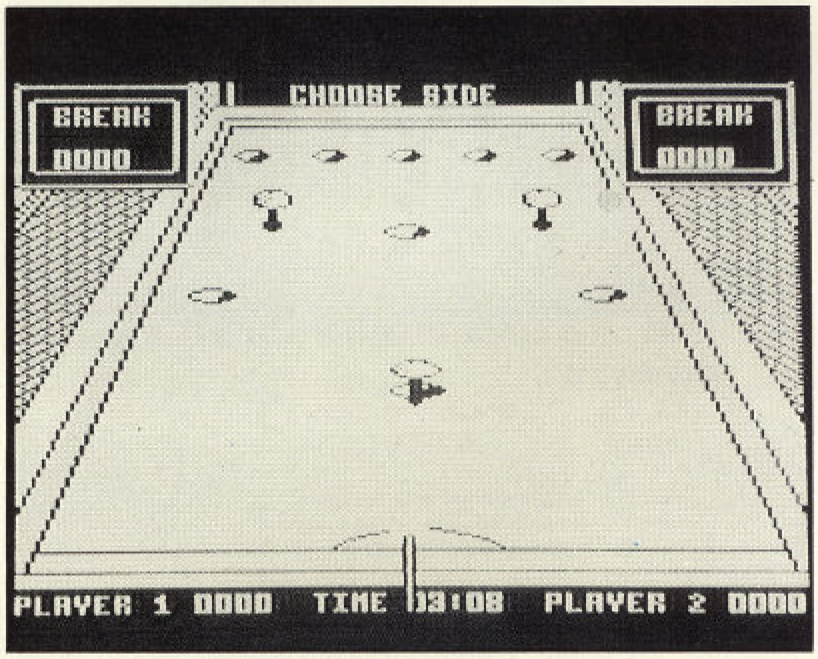
Alternatively titled "A drinking Man's Summer Games", Pub Games lets you keep your hand in when the Dog and Duck is closed or allows the kids to see what they have been missing before they are old enough to sample the dubious delights of the aforementioned hostelry. Seven different events are included for you to make a fool of yourself although, as if you do succeed in knocking over the black mushroom every time you step up to the bar billiards table, everyone will just assume that the landlord hasn't been watering the best bitter quite as much as usual.

Darts is the most popular pub game and is first to appear on the tape. Usual, rules, straight in, double out. Your hand wobbles fairly violently as you aim your arrow so it is not too easy to keep getting the high scores. The wire around the treble 20 also seems to have been strengthened considerably and unless your shot is dead on, your dart bounces to the floor off the wire. However, if you do manage to score a maximum, then there is a recognisable version of a drunken "180".

Bar billiards is played over a set period of time with the objective being to pot balls billards fashion whilst avoiding knocking over three strategically placed wooden mushrooms. You must select the angle, power and spin of your shot. The table is superbly depicted as shown from where you would actually stand if you were playing and the only problem is a bit of dodgy bouncing when several balls collide at the top of the table.

Dominoes is a well presented version of the game, the main problems being that you can see what your opponent is holding if, like me, you are unscupulous. It is also easy to lose track of both ends of the chain if you are not careful so that you need to remember what doms are on the table.

Table football is the best of three games with nine balls per game. The computer selects which ever rod the ball is nearest and all you have to do is move up and down on the rod to position your men and move backwards and forwards to kick. Great fun this.




The two card games are a bit naff. Pontoon is a straight-forward buy, twist and stick version. You start off with £10 and play for 10 consecutive hands or until your money runs

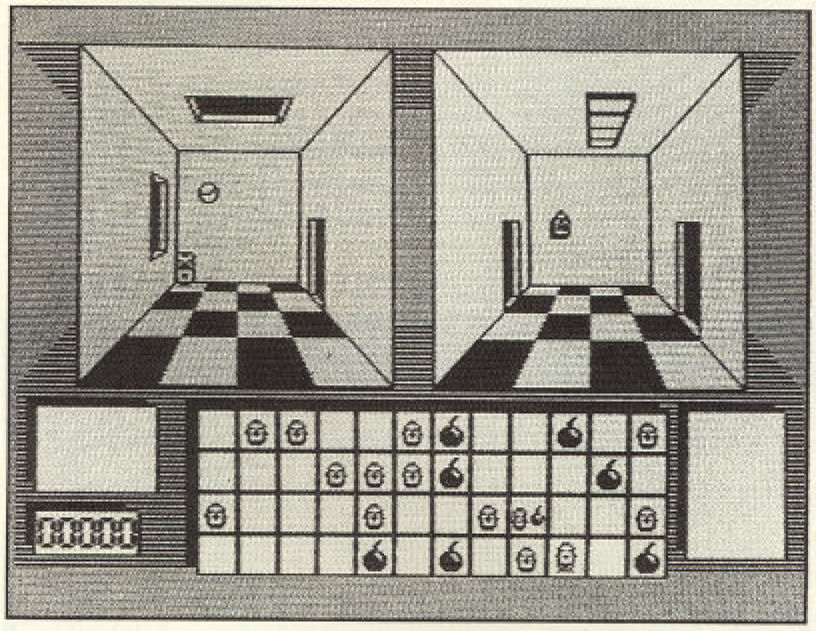
out. The version of poker though would make the Cincinnatti Kid turn in his grave though. Ten hands are dealt in succession and you get one chance to replace as many cards as you want in an attempt to improve your hand. There is no betting per se apart from an initial ante and money is paid out according to fixed odds on what hand you hold although these are well below what they should be (out by a factor of thousands in some cases!)

The final game is skittles. Two targets move across the screen at different speeds, the one at the front representing your hand and the one at the back being where you are aiming. Press the button and the ball travels in a straight line between the two, hopefully knocking down a few skittles en route.

Pub Games is not a bad collection of events. There are a few quirks such as player one sometimes using joystick one and sometimes joystick two which is a trifle annoying when you find all your pints (sorry points!) going to your opponent's total. Also, although you can practise on your own, you really need someone else to play against. Personally, I prefer the real thing, watered pints and all.

**G.R.H.**

*Touchline*
*Name:* ***Pub Games.*** *Company:* ***Alligata, 1 Orange St, Sheffield.*** *Price:* ***£7.95.*** *Machine:* ***C64.***
*Originality:* ***7/10.*** *Graphics:* ***7/10.*** *Playability:* ***7/10.*** *Value:* ***6/10.***



## DEACTIVATORS

It's quite refreshing when a new style of game pokes its head into the office. Deactivators is certainly one of these and offers every games player a challenge.

The Deactivators are in control of an office complex and have been given the job of defusing a number of bombs that someone has kindly left lying around the complex.

Simple you might think, wander around the buildings find the bombs and get rid of them. Well you'd be wrong. Firstly you can't get all of the bombs out of the office block since some of the transporters, it's a very modern office, don't work. Plus there are of course the nasties out to stop you.

The game has five different office buildings of different complexities. You start off in a four by four building that is obviously very easy to find your way around. The droids that are given the job of cleaning out this setup can only move around limited areas within the rooms. The playing area shows you the droid that you are currently controlling and the room next door. The playing area is actually shown in 3D. The droids actually change in size as they move towards the back or front of the room which is an extremely nice touch.

Moving around and between the rooms is simply a matter of going through doorways dropping through holes in floors, up and down firemans poles and via matter transporters.

The first level should really be treated as a practice one. The simple four by four layout giving you a taste of what is to come. As an example of the type of problem that you have to overcome consider the plight of the droid whose nearest transporter will not work and is stuck within only two rooms with a bomb to keep him company. One of the other droids must find a circuit board that is missing from the computer console, insert it in its proper case so that the original droid can get rid of a bomb. Simple isn't it?

Once you get on to the later levels the fun really starts. I forgot to tell you earlier that the office complex has been open to some experimentation in gravity. This means that some of the rooms totally ignore the normal effects of Newton's discovery. You may find that the floor has suddenly become the ceiling or the wall has suddenly become the floor. This can get you really confused when you are trying to control a droid.

Usually only one droid has access to the building's outer door where the bombs must be detonated. This means that you have a certain amount of switching between droids. For example one droid may get hold of a bomb, he may then have to throw it through an open window, only to be caught by a droid in the next room, who must then rush to the outside door and get rid of it. This is no problem on the first room but certainly presents further problems later on in the game.

As mentioned, the programmers have included some nice graphics effect s, especially the 3D mentioned earlier. However, colour has been used very little in the game and tends to give you a feeling of emptiness as though nothing is happening. This however isn't the case as the game is fast and furious and doesn't leave you a second spare.

An excellent game which is refreshingly different. Even if it is a little difficult to play at first.

*Touchline*
*Name:* ***Deactivators.*** *Company:* ***Ariolasoft, 68 Long Acre, Covent Garden, London WC2.*** *Tel:* ***01 836 8411.*** *Machine:* ***C64.*** *Price:* ***£9.95.***
*Originality:* ***10/10.*** *Graphics:* ***7/10.*** *Playability:* ***6/10.*** *Value:* ***8/10.***

# Christmas Shopping

*By Marie Curry*

Appreciative as always of your problems, we decided to bring you a special guide to what to buy the Commodore owner who has everything.

Christmas is a time of good cheer, parties, loving your neighbour and general high spirits. However it can also be a time of lots of brain-racking and headaches. Those awkward people who never seem to need after-shave, bath foam or M&S gift vouchers suddenly reappear in your life demanding presents on December 25. If these people also happen to own a Commodore computer then your problems could be solved by reading our buyer's guide. We've picked out lots of interesting and useful items to suit every pocket.

Then again if you're a Commodore owner and you don't want yet another ghastly jumper from your aunty Vi, leave *Your Commodore* open at this page on the coffee table when the relatives come round and you never know your luck!

## Under £20

### Operation Alignment

*Operation Alignment* is an offspring of *Operation Caretaker*, released last year by Global. This version contains only the alignment tape and screwdriver for adjusting tape heads and is in a smaller wallet.

**Company:** Global Software
**Address:** PO Box 67, London SW11 1BS
**Tel:** 01 228 1360
**Price:** £5.95

### Mouse-House

If you think that your computer mouse lacks personality and looks chilly in winter, then perhaps the furry *Mouse-House* from Digital Delicatessen could solve your problem. It's also aimed at making your mouse feel more comfortable in your hand. The silly season has definitely arrived.

**Company:** Digital Delicatessen
**Address:** Unit 208, 22 Highbury Grove, London N5 2EE
**Tel:** 01 359 5045
**Price:** £6.95

### Banana Disks

Cheer up Christmas day by going bananas and buying someone some disks for their stocking. *Banana Disks* are reversible and double sided double density.

**Company:** Disking
**Address:** Freepost, Liphook, Hants GU30 7BR
**Tel:** 0428 722563
**Price:** £9.95 per 10 pack. 50p p&p per pack.

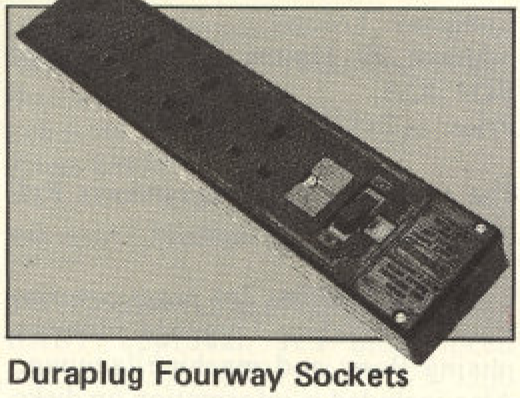
### ICPUG

The *Independent Commodore Products Users Group* has over 70 local clubs with regular meetings. It publishes a newsletter every two months containing 80 pages of news, reviews and information. *ICPUG* supports all Commodore machines from the PET to the Amiga.

**Name:** ICPUG
**Address:** Jack B Cohen, Membership Secretary, 30 Brancaster Road, Newbury Park, Ilford, Essex IG2 7EP
**Price:** One year subscription (UK) £10

### Duraplug Fourway Sockets

For those who are fed up of living amid a tangle of wires. The *Duraline* range comprises of two models: the non fused 4135 and the fused 4136. Features include a rocker on/off switch, a neon mains indicator and a removable terminal cover for easy wiring.



**Duraplug Fourway Sockets**

**Company:** Duraplug Electricals
**Address:** Westwood Works, Margate Road, Broadstairs, Kent
**Tel:** 0483 68771
**Price:** around £10

### Konix Speedking

A new design of joystick giving instant response to your movements. It's microswitch based and is designed to fit your hand not the table top giving comfort even during the longest games. It has a 12 month guarantee.

**Company:** Konix
**Address:** Unit 13, Sirhowy Industrial Estate, Tredegar, Gwent NP2 4QZ
**Tel:** 049525 5913
**Price:** £12.99

### Commodore 128 Reference Guide for Programmers

This book is published by Sams, the company which brought out *The Commodore 64 Reference Guide*. The first chapters review elementary topics and later chapters concentrate on special programming applications. All operating systems are described in the

book plus hardware and software specifics and details of input and output features. There are also complete RAM and ROM maps with tips for memory management.

**Company:** Pitman Publishing
**Address:** 128 Long Acre, London WC2E 9AN
**Price:** £16.95 plus £1.70 p&p
**ISBN:** 0 627 22056 3

**Trilogic's GT Loader**

Essentially a fast loader, this cartridge has a reset button to protect the cartridge on your 64. It works well with most 64 software and if there are any problems it reverts the program to the normal loading process.

**Company:** Trilogic
**Address:** 29 Holme Lane, Bradford BD4 0QA
**Price:** £17 (£18 with reset)

**The Official C128 Programmers Reference Guide**

The book contains 744 pages covering Basic 7, machine language monitor, mixing Basic and machine language. Also included is information on disks, printers, RS232, modems, joysticks etc. There is a CP/M section and hardware schematics and electrical specifications.

**Company:** Level Ltd (Computer Publications)
**Address:** Biblios Distribution Ltd, Star Road, Partridge Green, Nr Horsham, W Sussex RH13 8LD.
**Price:** £18.90 plus £2 p&p

**Script/Plus Cartridge**

The *Script/Plus Cartridge* from Parasoft is for the C16 and Plus/4. It's a wordprocessor called Easyscript, already well known in its own right, with lots of extras also packed into the cartridge. Features include block move and erase, search and replace, variable margins, final printout preview and disk or cassette options. There's also a 150 page manual detailing all the functions available.

**Company:** Parasoft
**Address:** 9 Park Terrace, Worcester Park, Surrey KT4 7JZ
**Tel:** 01 330 6911
**Price:** £19.95

**Trojan Light Pen – Plus/4 and C16**

The *Trojan Light Pen* allows you to write or draw free hand on the screen. There are five pen thicknesses including quills. The Paint Brush can use all 16 colours plus eight brightnesses to give 128 shades. Possible geometric shapes include circles, boxes, lines, triangles and banding. Colour fill is available in any area with any colour.

**Company:** Computer Cupboard
**Address:** Freepost, London W5 1BR
**Price:** £19.95 inc p&p

**Magic Disk Kit**

Everytime you use your disk drive the protection on your software bangs your playing head and can eventually knock it out of place. The *Magic Disk Kit*, supplied with a book of tips, can help remedy head alignment faults and help your machine's performance and also increase its life.

**Company:** Robtek
**Address:** Unit 4, Isleworth Business Complex, St John's Road, Isleworth, Middx TW7 6NL
**Tel:** 01 847 4457
**Price:** £19.95

**Super Diskdoc**

*Super Diskdoc* is a Commodore 64 utility which enables you to protect your valuable data, zoom in on the bytes on your disk, interpret them in hex, ASCII or English, make changes and replace them. In the event of an accident Super Diskdoc can make the best possible repairs.

**Company:** Precision Software
**Address:** 6 Park Terrace, Worcester Park, Surrey KT4 7JZ
**Tel:** 01 330 7166
**Price:** £19.95

**Trojan CAD-Master**

This package includes a Trojan C64 light pen, a graphics software and an instructions booklet. Facilities available are freehand draw, paint brush, shape fill, geometric shapes, dynamic rubber banding and pin point function.

**Company:** Microcomputer Software and Accessories
**Address:** Trojan Products, Dept Y Com, 166 Derlwyn Dunvant, Swansea SA2 7PF
**Tel:** 0792 205491
**Price:** £19.95 for package

## Under £50

**I-Con**

The *I-Con* from Trilogic gives you 80 columns on your TV or monitor. It can convert RGBI into RGB and is fully compatible with the C128. All 16 colours are available in both modes and an audio lead is included in the price.
**Company:** Trilogic
**Address:** 29 Holme Lane, Bradford BD4 0QA
**Tel:** 0274 684289
**Price:** £27.95 inc VAT and p&p

**Microscribe Light Pen**

A compact robust pen, no bigger than an ordinary ballpoint which connects to the joystick port of the C64. Included with the pen are a booklet and a software package. This is a light, cheap and simple to use piece of hardware.

**Company:** Mirrorsoft
**Address:** Purnell Book Centre, Pulton, Bristol BS18 5LQ
**Price:** £29.95

**The Expert Cartridge**

*The Expert Cartridge* from Trilogic is for the C64. It can freeze and save programs to disk, saves programs on one file, compacts programs to reduce disk space used, saves more programs faster and uses RAM and disk based software for instant low cost upgrading.

**Company:** Trilogic
**Address:** 29 Holme Lane, Bradford BD4 0QA
**Tel:** 0274 684289
**Price:** £31.95 inc VAT and p&p

**Pet Upgrade Boards**

Courtesy of Supersoft you can now upgrade your PET. The *RAM Plus* boards allow any machine to be upgraded to a full 32K. The *RAM Plus* 16K will upgrade a 16K PET and the *RAM PLUS* 24 upgrades any large keyboard machines from 8K to 32K.

**Company:** Supersoft
**Address:** Winchester House, Canning Road, Wealdstone, Middx HA3 7SJ
**Tel:** 01 861 1166
**Price:** *RAM Plus* 16K – £35, *Ram Plus* 24K – £60

### The Final Cartridge

The *Final Cartridge* is an operating system built in a cartridge and is compatible with 98% of all programs. It includes a disk turbo, tape turbo, advanced centronics interface, screen dump facilities, 24K extra RAM for Basic, Basic 4.0 commands, Basic Toolkit, preprogrammed function keys, extended ML monitor, reset switch and freezer.

**Company:** H&P Computers
**Address:** 9 Hornbeam Walk, Witham, Essex CM8 3SZ
**Tel:** 0376 511471
**Price:** £45

### Static Buster

Integrity Solutions' *Static Buster* is designed to combat the effects of static electricity on your computer. It diverts electricity from the keyboard, screen and operator. *Static Buster* consists of a small unit with two leads, each with a pick up head which attaches to a screen or keyboard. A third lead attaches to an earth point and the system soaks up static.

**Company:** Integrity Solutions
**Address:** 504 Manchester Road, Rochdale, Lancs 0L11 3HE
**Tel:** 0706 34535
**Price:** £49.95

### Citizen Two Colour Printer

The *Citizen Two Colour Printer* is designed to be completely compatible with the Commodore range of computers. It uses roll paper 80mm wide, the same as most office calculators. There are a large number of commands available. All Commodore graphics characters can be printed and listings can also be printed out in lower case mode. The ribbon is black and red so text can be highlighted.

**Company:** Citizen
**Address:** Burston Marsteller, 25 North Row, London W1R 2BY
**Tel:** 01 831 6262
**Price:** £49.95

## Under £100

### Commodore Computer Courses

Microwise UK has introduced home studies courses using your own Commodore. Courses are suitable for both children and adults who wish to gain a better understanding of their computer and computers in general. Subjects now available for the C64 are Introductory and Advanced Programming, Assembly Language, Graphics and Applications. Software and text is included with each course.

**Company:** Microwise UK
**Address:** 75 Prettygate Road, Chichester C03 4ED
**Tel:** 0206 575718

### Vidcon

C128 owners in need of an 80 column monitor may be interested in this Trilogic product. *Vidcon 1* allows any TV or monitor to display the 80 column output of the 128 in any of the 16 available colours. The *Vidcon 2* has the same function but cannot be used with a standard TV and the *Vidcon 3* is a monochrome version of *Vidcon 1*.

**Company:** Trilogic
**Address:** 29 Holme Lane, Bradford BD4 0QA
**Tel:** 0724 685926
**Prices:** *Vidcon 1* £59.95, *Vidcon 2* £49.95, *Vidcon 3* £29.95.

### Opus Organiser Desk

The *Opus Organiser Desk* is designed to help you sort out your computer system. There is shelving to accommodate your monitor, printer, computer, disk drive, cassette recorder and software and the teak finished unit is fitted with cstors to make it fully mobile. Assembled dimensions are height 31", width 40¼" and depth 26".

**Company:** Opus Supplies
**Address:** 55 Ormside Way, Holmethorpe Estate, Redhill, Surrey
**Tel:** 0737 65080
**Price:** £59.95 (inc VAT and delivery)

### Computer Weekend Breaks

Cheap and educational these weekends away allow you to get away from it all and expand your computing knowledge at the same time. Hosted by Ardmore Adventure and Crest Hotels there are weekends specially designed for Commodore users of all ability levels.

**Company:** Ardmore Adventure
**Address:** 23 Ramilies Place, London W1
**Tel:** 01 439 4461
**Price:** about £60

### Kempston Mouse

The *Kemspton Mouse* (available for the C64 and C128) uses and optical system to decode movements of an internal tracker ball and is precisely monitored by the interface using a simple port read. This feature means the protocol can be easily incorporated into existing or future graphics or business packages.

**Company:** Kempston
**Address:** Unit 4, Manton Lane, Bedford MK41 76HY
**Tel:** 0234 327554
**Price:** £69.95

### Voyager 7 Modem

The *Voyager* range of modems has full BABT approval. It's multi-speed including 300/300, 1200/75, 75/1200 full duplex and 1200/1200 half duplex, LED and computer status messages and (according to Modem House) more software than any other modem.

**Company:** Modem House
**Address:** 70 Longbrook Street, Exeter, Devon EX4 6AP
**Tel:** 0392 213355
**Price:** £91.94 (inc VAT)

As an extra with this product you can buy the *Mustang 32* Cartridge which provides autodial, auto answer and fullprint support. It's available from Modem House and costs £49.95.

## £100 plus

### 64 Multimodem

This modem gives you databases, bulletin boards, electronic mail and Prestel on your Commodore 64 or 128. Features include autodial and auto-answer, comms software on board in ROM. It's menu driven and multispeed with CCITT V21/23 and Bell 103 standards, baud rates 300/300, 1200/75 and 75/1200.

**Company:** Miracle Technology
**Address:** St Peters Street, Ipswich IP1 1XB.
**Tel:** 0437 216141
**Price:** £116.15 (inc VAT and p&p).

**Red Boxes**



*Red Boxes* are a new way in which your computer can help run your life. They are programmed, using your C64 or C128, to send signals along the mains wiring of a domestic house to control lighting, heating and other appliances powered by a 13amp socket. They can also receive and react to signals from devices such as intruder detectors, smoke detectors and temperature gauges. The *Red Box Starter Pack* contains three units Red Leader, Red One and Red Two.

**Company:** General Information Systems
**Address:** 1 White Hart Yard, London SE1 1NX
**Price:** £129 (starter pack)

**Enhancer 2000**

The *Enhancer 2000* disk drive is Commodore compatible and super high speed compared to Commodore's own drives. It comes with a one year warranty and is suitable for double density 5¾", 35 track disks. It has a direct drive spindle motor and uses no computer memory. Bundled free with the disk drive is master writer and icon driven word processor worth £50.

**Company:** Firstline Software
**Address:** 206 Great North Road, Eaton Socon, St Neots, Cambs PE19 3EF.
**Price:** £137.50 inc VAT and p&p (£5 extra for one day express mail).

**Epilog-1 Cartridge System**

This user-friendly system allows you to store permanently Basic and machine code programs on to a cartridge. A special eraser system is included which can clear the cartridge for reuse. The system pack includes: cartridge programmer, cartridge eraser, user-friendly operating system and an eraseable cartridge.

**Company:** Sircal Instruments
**Address:** 11 Southfields Court, Sutton Common Road, Sutton, Surrey SM1 3HJ.
**Tel:** 01 644 0981
**Price:** £144.95 inc VAT and p&p

**WS000 Modem**

The *WS4000* from Miracle Technology is fully intelligent and speed buffered and offers autodial and autoanswer as well as Hayes type compatibilty. In standard version the *WS4000* supports the CCITT V21 and V23 standards offering speeds of 300, 600, 1200, 1200/75 and 75/1200. Optional upgrades include V22 1200 baud full diplex and V22bix 2400 baud full duplex plus options of DTMF tone dialling, battery packed internal telephone directory, process control port and BELL standards for transatlantic communication.

**Company:** Miracle Technology
**Address:** St Peters St, Ipswich IP1 1XB
**Tel:** 0473 216141
**Price:** £149.95

**Star Printers**

Two star printers have been reduced in price and are now much more accessible to home users on a low budget. They are the 18cps *Powertype* daisy wheel printer and the 60cps stx-80 thermal printer.

**Company:** Star Micronics
**Address:** Craven House, 40 Uxbridge Road, Ealing, London W5 2BS
**Tel:** 01 840 1800
**Price:** *Powertype* £229, *stx-80* £79

**Connoisseur's Collection**

Following last year's special Commodore computer pack, Commodore is attacking this year's Christmas market with a collection of products based around the new 64C computer, a re-styled version of the standard Commodore 64.

The Connoisseur pack comes complete with a 64C computer, cassette versions of the well known board games *Monopoly, Scrabble, Cleudo, Chess* and *Renaissance*. For those of you who are interested in typing, the official Pitman typing course is included and for graphics freaks a mouse and graphics software are also bundled inside.

So that you can use this pack as soon as you get it home a Commodore cassette recorder is also provided.

**Company:** Commodore UK
**Address:** 1 Hunters Road, Weldon, Corby, Northants NN17 1QX.
**Tel:** 0536 205252
**Price:** £249.99




**Commodore C128**

For those of you who are more interested in putting your computer to work than playing games all of the time, the Commodore 128 computer is definitely well worth looking at.

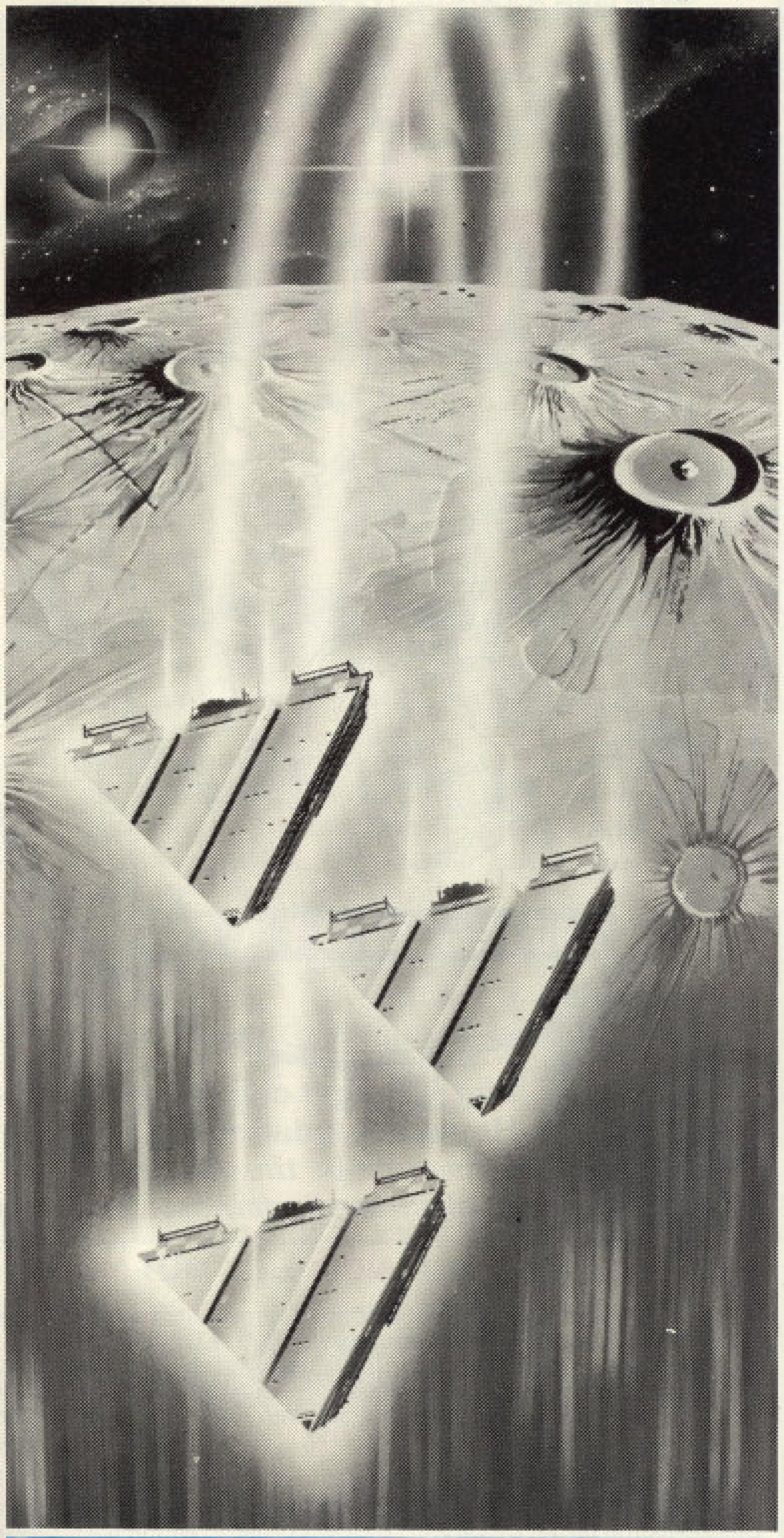
The Commodore 128D computer comes complete with a built in double sided disk drive, ideal for running business packages. The computer maintains compatibility with the Commodore 64 computer and just about all 64 software will work on the C128 without any problems.

The Basic has been expanded from the C64 version of the language making it an ideal machine for someone who is interested in writing their own programs.

If you are interested in using this machine for business then you will be pleased to learn that this computer is compatible with CP/M. A system that has been running on business machines for a number of years. This means that a large number of business programs are already available for this machine, including the ever popular Wordstar wordprocessor program. YC

**Company:** Commodore UK
**Address:** Commodore Business Machines Ltd, 1 Hunters Road, Corby, Northamptonshire NN17 1QX
**Tel:** (0536) 205252
**Price:** £499

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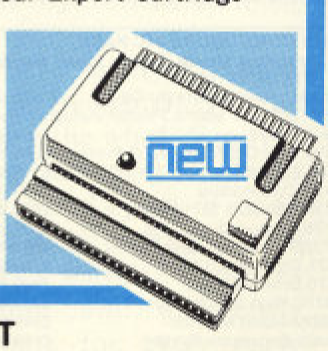
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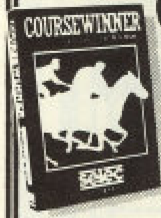
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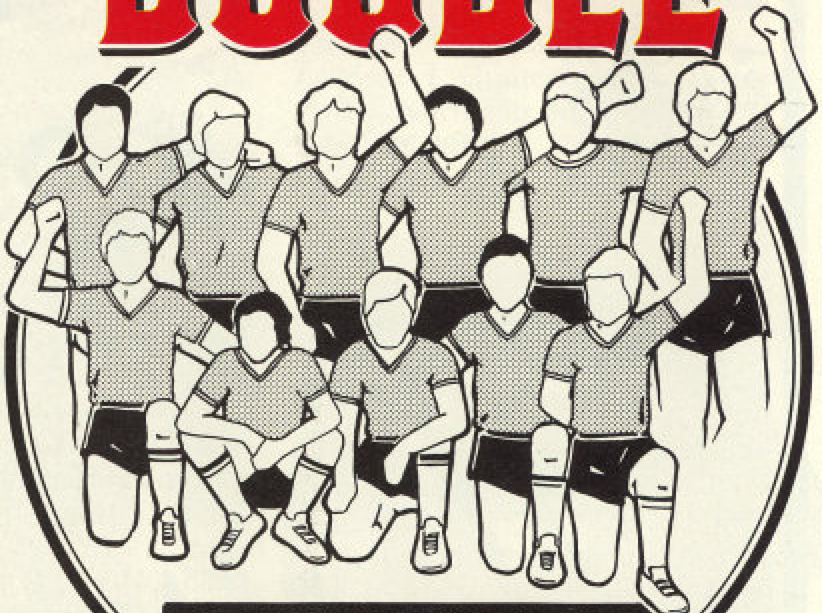
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COMMODORE 64, ATARI

# On-Going News Situation: US

*America, birthplace of Commodore machines, is still fertile ground for new ideas. Our Stateside correspondent brings you the latest from over there.*

***By Lewis Tilley***

Party time everybody! Party time! This is the familiar cry during the holiday season in the States. From the humblest room in a school dormitory to the swank penthouse offices of the advertising agencies in the big towns, this invitation to fun and games is heard. This column is devoted to helping you have the best of all times in this season. A full page advertisement in a favourite Commodore magazine gets us off to the right start with a bright read heading: CELEBRATE EVERY OCCASION WITH YOUR COMPUTER!, it reads. The ad continues "you've no idea just how much fun your computer can be!", and invites you to a party software line with *Cardware* ($9.95), *Partyware* (£14.95), *Heartware* ($9.95) and, so help me, *Warewithall* ($14.95). The last 'punny' named product doesn't actually include software but supplies you with all the colourfully designed paper, envelopes, stickers, markers, disk labels and a disk on to which you print the other disks. They are all offered by Hi-Tech Expansions Inc. What hath Printshop wrought?

Now that you have an invitiation to a party in the US, it's time to look at the culture. Join me in some of the different versions of American football to which you were introduced in the flesh last summer.

*World's Greatest Football* by Epyx has scrolling playing fields and tricky windows and icons and costs $35. Epyx also does *World's Greatest Baseball* which isn't quite up to the standard of the football game.

*On-Field Football*, $29.95 by Gamestar, uses only six men on a team and might get neophyte fans confused about the real games. Gamestar's *On-Court Tennis*, also $29.95, seems to give a more realistic version of that game with 3D, shadows, foreshortening and good joystick controls.

*Super Bowl Sunday* ($35) from the Avon Hill Game Company, is a total control simulation which uses the two football conferences, AFL/NFL, in games based on statistics of Super Bowls in the past. This game as been called "the outstanding statistical replay football program in the computer field".

There has been an Expansion Disk 1 previously issued which covered the 1984-85 National Football League season. For this Christmas we have the Expansion Disk 2 which digs into the past for more super teams. Would you believe Detroit-Cleveland 1953? I can barely remember it. The expansion disks are only $20 each.

Had enough American football? Epyx follows *Summer Games I and II* and *Winter Games* with *World Games*. You travel around the globe to compete in eight different events. Or with another Epyx title you could stay in one squared circle and wrestle all by yourself or with a friend andyour joysticks. In *Championship Wrestling* there are 20 holds plus overhead graphics. For bike racers there is also the new *Super Cycle* from Epyx.

*Leader Board* has been one of the outstanding computer sports presentations for the American market (and now it has also met with success in the UK). It is the sound and the swing which makes the golf game so satisfying. One feels that they have actually grooved a club like a master.

Leader Boards's publisher, Access software Inc., is issuing 10th Frame, "the professional bowling simulator" by the same authors, Bruce and Roger Carver, for the Christmas trade. Both of these games cost a whopping $39.95 here in the US. I bought my *Leader Board* on a legit non-pirated magazine disk in Italy for 13 Lira (about $10). Of course there was the other $800 for the flight, you can't win.

A recent reconstruction in Japan of the interior of *221B Baker Street* was modelled on one that was done in London at the time of the last coronation. This boardgame adaption of the same name doesn't give you the feeling of being with Holmes in his own digs but it does challenge you with 30 cases of the old Sleuth in Victorian London. Thirty more cases are being prepared for future issue by Intellicreations/ Datasoft.

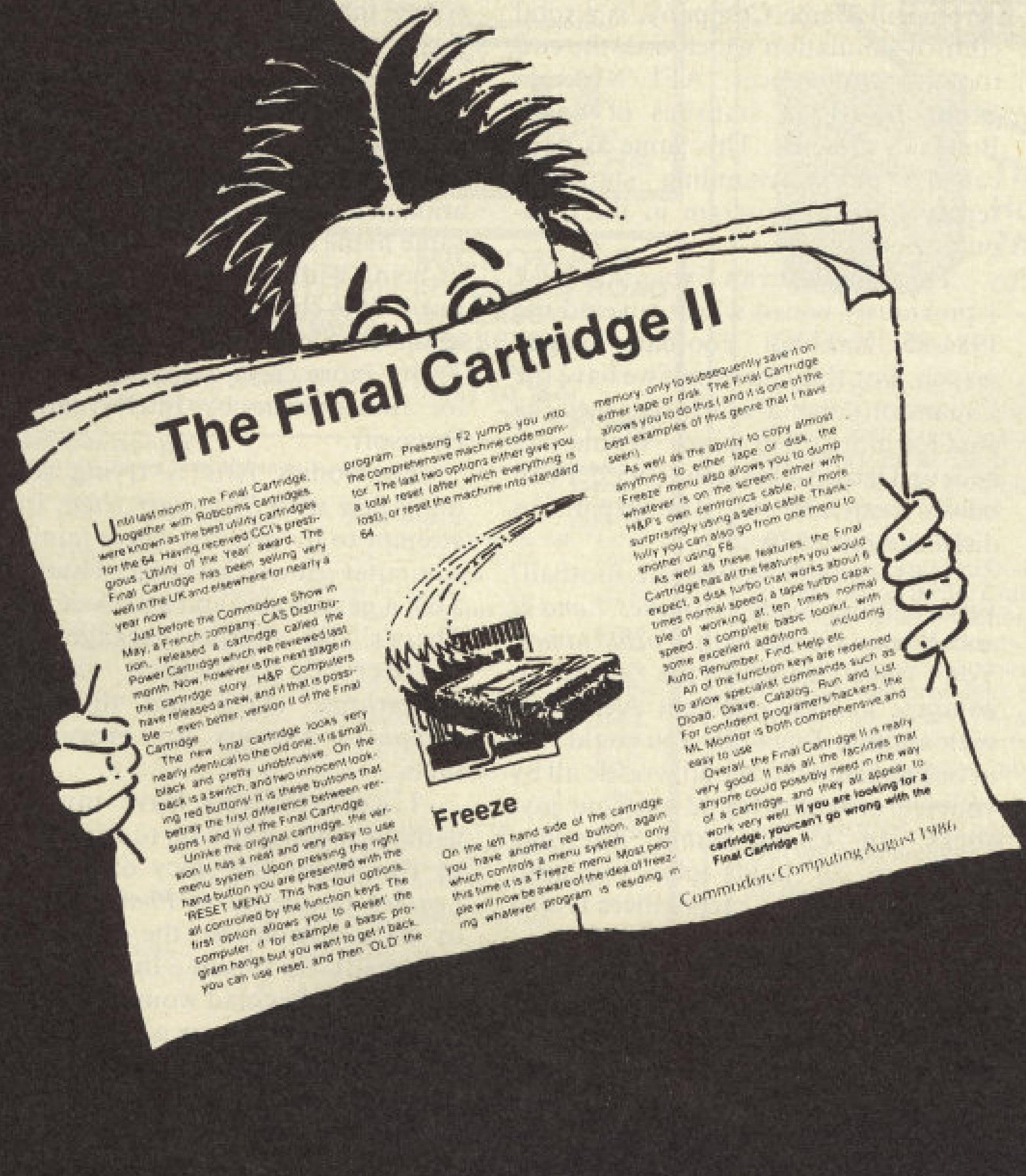
Electronics Arts is trying something new with *Scavenger Hunt*. In an attempt to involve the whole family in computer games, Scavenger Hunt uses a 64, a gameboard and a pack of cards. There's also another package called Murder Party which supplies invitations, clues and differently computed answers for every party time.

I can't let you leave my party without sending you on to another one so I've saved the spicy one till last. *Leather Goddesses of Phobos* (shortly to be available in the UK, I am informed) is from Infocom and features leather clad women who want to turn earth into a sex scene for themselves. Cheap thrills from a computer, a rather dubious sales ploy, I'm inclined to believe.

To conclude, I think that I've included something for everyone in every sense so all that remains is to wish you a Merry Christmas and a Happy New Year. YC

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# Listings

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You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10    :LN=70    :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

**by Eric Doyle**

## Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing! YC

| Mnemonic | Symbol | Keypress |
|---|---|---|
| [RIGHT] | | CRSR left/right |
| [LEFT] | | SHIFT & CRSR left/right |
| [DOWN] | | CRSR up/down |
| [UP] | | SHIFT & CRSR up/down |
| [F1] | | f1 key |
| [F2] | | SHIFT & f1 key |
| [F3] | | f3 key |
| [F4] | | SHIFT & f3 key |
| [F5] | | f5 key |
| [F6] | | SHIFT & f5 key |
| [F7] | | f7 key |
| [F8] | | SHIFT & f7 key |
| [HOME] | | CLR/HOME |
| [CLR] | | SHIFT & CLR/HOME |
| [RVSON] | | CTRL & 9 |
| [RVSOFF] | | CTRL & 0 |

| Mnemonic | Symbol | Keypress |
|---|---|---|
| [BLACK] | | CTRL & 1 |
| [WHITE] | | CTRL & 2 |
| [RED] | | CTRL & 3 |
| [CYAN] | | CTRL & 4 |
| [PURPLE] | | CTRL & 5 |
| [GREEN] | | CTRL & 6 |
| [BLUE] | | CTRL & 7 |
| [YELLOW] | | CTRL & 8 |
| [POUND] | | £ |
| [LARROW] | | ← |
| [UPARROW] | | ↑ |
| [PI] | | SHIFT & ↑ |
| [INST] | | SHIFT & INST/DEL |
| [REV T] | | see text |
| [Cletter] | | CBM + letter |
| [Sletter] | | SHIFT + letter |


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The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

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### The Cassette

All programs on the cassette are saved using a turbo program. If you have ever purchased software from us on cassette before it is worth pointing out that as of this issue cassette the turbo used has been altered. On all cassettes for previous issues the programs are unprotected and appear in the same format as they do in the magazine i.e. in the form of Basic loaders. The new turbo being used from this issue onwards allows us to produce fully working versions of the program on cassette. This means that you will simply have to LOAD the programs in and they will automatically start. Should we put any programs for the C128 on the cassette they will be stored as C64 programs. LOAD these programs into the computer in C64 format and resave them to cassette or disk. To use the program turn your computer into C128 mode and LOAD and RUN as normal.

### The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.

These programs are available on disk.

### Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape. YC

### UTILITY SPECIAL

This contains a few of our most popular utilities from earlier issues of the magazine. The programs are:

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## NOVEMBER 1986

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# Remember the Plus/4

*Joe Bradley provides some more utilities for your Plus/4.*

If you feel that your programming skills are coming along fairly well, then this article should be of interest to you. I propose giving three major utilities all to be used via the direct mode.

(a) A FIND routine which will be of use in developing Basic programs. FIND a$ would list all Basic lines containing a$, ready for you to examine or change.
(b) A MERGE routine for disk use which will merge all or part of a program on the disk with a program in memory. The routine is a true merge in that you could select a subroutine from a program on disk and merge it with a program already in the Plus/4 memory - not add it on the end as is the case with many Merge programs.
(c) An assembler for the Plus/4 which would support all labels etc. and enable you to write machine code programs in assembler language.

## Starting Up

The program in its completed state is loaded from disk or tape into the normal Basic area. The first part is in Basic which operates routines to move the utilities into memory starting at $E300, lowers the top of memory to protect the routines and inserts a wedge in the GETCHR routine so that new Basic commands FIND, MERGE and ASSEMBLE are accepted.

First type in the Basic program in Figure 1. The SYS 4528 will operate the sequence which initialises the program, the screen is cleared and a heading printed so that you know the program is raedy for use. DO NOT RUN this program before typing in the initialisation program which is given in Figure 2.

**FIG. 1 INITIAL PROGRAM**

```
10 PRINT"[CLEAR]";:SYS4528
20 PRINT"[SPC4]****************************"
25 PRINT"[SPC4]*  PLUS/4 SUPPORT SYSTEM *"
30 PRINT"[SPC4]****************************"
35 PRINT:PRINT
40 PRINT"[SPC7]ASSEMBLE"
45 PRINT
50 PRINT"[SPC7]FIND"
55 PRINT
60 PRINT"[SPC7]MERGE"CHR$(34)"PRG NAME"CHR$(34)",
        START-FINISH"
70 NEW
```

I have decided that the bestd way to enter machine code is to use the monitor. The reason most programs are written in data statements is that the C64 does not have a monitor. So type M[Shifted0] and [RETURN] to go into monitor, then M 11B0 [RETURN] will display the first block of memory. Change the memory locations to read as in Figure 2. At the

**FIG. 2 INITIALISATION**

```
>11B0 A9 4C 8D 7D 04 A9 43 8D    >1248 01 01 C9 1F D0 11 BD 02
>11B8 7E 04 A9 E3 8D 7F 04 A9    >1250 01 C9 87 D0 0A A5 3B D0
>11C0 E2 85 04 A9 FF 85 03 85    >1258 06 A5 3C C9 02 F0 0A AE
>11C8 14 A0 01 A9 11 85 15 B1    >1260 06 E4 A0 00 B1 3B 4C 81
>11D0 14 91 03 C8 D0 F9 E6 04    >1268 04 A0 00 8E 09 E4 84 0B
>11D8 E6 15 A5 15 C9 29 F0 02    >1270 A2 FF E8 BD 00 02 30 E7
>11E0 B0 04 A0 00 F0 E9 A9 E3    >1278 C9 20 F0 F6 B9 AB E3 F0
>11E8 85 34 85 38 A9 00 85 33    >1280 DE 5D 00 02 D0 04 C8 E8
>11F0 85 37 60 54 41 52 41 53    >1288 10 F2 C9 80 F0 0A C8 B9
>11F8 53 45 4D 31 31 30 03 FF    >1290 AA E3 10 FA E6 0B D0 D8
>1200 8D 3E FF 58 60 78 8D 3F    >1298 E6 3B CA 10 FB 20 13 E3
>1208 FF 60 8D 3E FF B1 22 8D    >12A0 A6 0B BD D1 E3 48 BD D7
>1210 3F FF 60 A2 12 BD 00 E3    >12A8 E3 48 60 46 49 4E C4 4D
>1218 9D E0 03 CA 10 F7 60 8D    >12B0 45 52 47 C5 41 53 53 45
>1220 08 E4 A9 E3 48 A9 41 48    >12B8 4D 42 4C C5 53 50 41 43
>1228 A9 03 48 A9 E4 48 BD DD    >12C0 45 53 50 41 43 45 53 50
>1230 E3 48 BD F1 E3 48 A9 03    >12C8 41 43 45 53 50 41 43 45
>1238 48 A9 DF 48 AD 08 E4 AE    >12D0 00 E4 E4 EB 00 00 00 09
>1240 06 E4 60 8E 06 E4 BA BD    >12D8 FF D8 00 00 00 FF 89 8E
```

end of the first block, M [RETURN] will display the next block of memory ready for you to change.

Have you done it correctly? This is always a worry but there is a check. On the Plus/4 you can disassemble the routine using the monitor.

Type D 11B0 12CF [RETURN] to disassemble the routine and it should be as Figure 3. If not, check for errors and adjust.

This may be as far as you wish to go in your first session, so I shall now look at the save routine which you will need to use at this point. We want to save the Basic program and the machine code routines at the same time, so while you are still in the monitor type:

S"UTILITIES",1,1001,2A00 for tape
or
S"UTILITIES",8,1001,2A00 for disk.

At the next session you will be able to load and save with normal Basic commands provided you do not alter the small Basic program at the start.

You can run the program to check what happens so far. You should see the heading appear and the cursor flashing to show that it is ready for your next command. Your new routines are not in yet, so if you type FIND [RETURN] the computer will probably hang. Don't do this just yet, although you can reset and reload your program. However if you look at the top of memory pointers $37, $38 you will see that top of memory has been

**FIGURE 3**

```
. 11B0  A9 4C     LDA #$4C
. 11B2  8D 7D 04  STA $047D
. 11B5  A9 43     LDA #$43
. 11B7  8D 7E 04  STA $047E
. 11BA  A9 E3     LDA #$E3
. 11BC  8D 7F 04  STA $047F
. 11BF  A9 E2     LDA #$E2
. 11C1  85 04     STA $04
. 11C3  A9 FF     LDA #$FF
. 11C5  85 03     STA $03
. 11C7  85 14     STA $14
. 11C9  A0 01     LDY #$01
. 11CB  A9 11     LDA #$11
. 11CD  85 15     STA $15
. 11CF  B1 14     LDA ($14),Y
. 11D1  91 03     STA ($03),Y
. 11D3  C8        INY
. 11D4  D0 F9     BNE $11CF
. 11D6  E6 04     INC $04
. 11D8  E6 15     INC $15
. 11DA  A5 15     LDA $15
. 11DC  C9 29     CMP #$29
. 11DE  F0 02     BEQ $11E2
. 11E0  B0 04     BCS $11E6
. 11E2  A0 00     LDY #$00
. 11E4  F0 E9     BEQ $11CF
. 11E6  A9 E3     LDA #$E3
. 11E8  85 34     STA $34
. 11EA  85 38     STA $38
. 11EC  A9 00     LDA #$00
. 11EE  85 33     STA $33
. 11F0  85 37     STA $37
. 11F2  60        RTS
. 1200  8D 3E FF  STA $FF3E
. 1203  58        CLI
. 1204  60        RTS
. 1205  78        SEI
. 1206  8D 3F FF  STA $FF3F
. 1209  60        RTS
. 120A  8D 3E FF  STA $FF3E
. 120D  B1 22     LDA ($22),Y
. 120F  8D 3F FF  STA $FF3F
. 1212  60        RTS
. 1213  A2 12     LDX #$12
. 1215  BD 00 E3  LDA $E300,X
. 1218  9D E0 03  STA $03E0,X
. 121B  CA        DEX
. 121C  10 F7     BPL $1215
. 121E  60        RTS
. 121F  8D 08 E4  STA $E408
. 1222  A9 E3     LDA #$E3
. 1224  48        PHA
. 1225  A9 41     LDA #$41
. 1227  48        PHA
. 1228  A9 03     LDA #$03
. 122A  48        PHA
. 122B  A9 E4     LDA #$E4
. 122D  48        PHA
. 122E  BD DD E3  LDA $E3DD,X
. 1231  48        PHA
. 1232  BD F1 E3  LDA $E3F1,X
. 1235  48        PHA
. 1236  A9 03     LDA #$03
. 1238  48        PHA
. 1239  A9 DF     LDA #$DF
. 123B  48        PHA
. 123C  AD 08 E4  LDA $E408
. 123F  AE 06 E4  LDX $E406
. 1242  60        RTS
. 1243  8E 06 E4  STX $E406
. 1246  BA        TSX
. 1247  BD 01 01  LDA $0101,X
. 124A  C9 1F     CMP #$1F
. 124C  D0 11     BNE $125F
. 124E  BD 02 01  LDA $0102,X
. 1251  C9 87     CMP #$87
. 1253  D0 0A     BNE $125F
. 1255  A5 3B     LDA $3B
. 1257  D0 06     BNE $125F
. 1259  A5 3C     LDA $3C
. 125B  C9 02     CMP #$02
. 125D  F0 0A     BEQ $1269
. 125F  AE 06 E4  LDX $E406
. 1262  A0 00     LDY #$00
```

```
. 1264  B1 3B     LDA ($3B),Y
. 1266  4C 81 04  JMP $0481
. 1269  A0 00     LDY #$00
. 126B  8E 09 E4  STX $E409
. 126E  84 0B     STY $0B
. 1270  A2 FF     LDX #$FF
. 1272  E8        INX
. 1273  BD 00 02  LDA $0200,X
. 1276  30 E7     BMI $125F
. 1278  C9 20     CMP #$20
. 127A  F0 F6     BEQ $1272
. 127C  B9 AB E3  LDA $E3AB,Y
. 127F  F0 DE     BEQ $125F
. 1281  5D 00 02  EOR $0200,X
. 1284  D0 04     BNE $128A
. 1286  C8        INY
. 1287  E8        INX
. 1288  10 F2     BPL $127C
. 128A  C9 80     CMP #$80
. 128C  F0 0A     BEQ $1298
. 128E  C8        INY
. 128F  B9 AA E3  LDA $E3AA,Y
. 1292  10 FA     BPL $128E
. 1294  E6 0B     INC $0B
. 1296  D0 D8     BNE $1270
. 1298  E6 3B     INC $3B
. 129A  CA        DEX
. 129B  10 FB     BPL $1298
. 129D  20 13 E3  JSR $E313
. 12A0  A6 0B     LDX $0B
. 12A2  BD D1 E3  LDA $E3D1,X
. 12A5  48        PHA
. 12A6  BD D7 E3  LDA $E3D7,X
. 12A9  48        PHA
. 12AA  60        RTS
. 12AB  46 49     LSR $49
. 12AD  4E C4 4D  LSR $4DC4
. 12B0  45 52     EOR $52
. 12B2  47        ???
. 12B3  C5 41     CMP $41
. 12B5  53        ???
. 12B6  53        ???
. 12B7  45 4D     EOR $4D
. 12B9  42        ???
. 12BA  4C C5 53  JMP $53C5
. 12BD  50 41     BVC $1300
. 12BF  43        ???
. 12C0  45 53     EOR $53
. 12C2  50 41     BVC $1305
. 12C4  43        ???
. 12C5  45 53     EOR $53
. 12C7  50 41     BVC $130A
. 12C9  43        ???
. 12CA  45 53     EOR $53
. 12CC  50 41     BVC $130F
. 12CE  43        ???
. 12CF  45 00     EOR $00
```

lowered to $E300 ready for our machine code.

A little more explanation now will help when you are writing your own routines, so let's look at the code in Figure 3.

The first six statements store the machine code command JMP $E343 in the GETCHR command in the operating RAM. The routine starts at $0473 and it deserves a few moments of study so disassemble it using the monitor and work out what it does. This is the routine which is in constant use when the computer is executing Basic routines. When you type [RETURN] after a direct command the operating system uses this routine to read your instruction.

Our new command inserted into the routine is called a wedge and will enable the computer to look our new commands' before the operating system looks for a normal Basic command. If it finds one of our new commands our program will be executed, otherwise operation will be returned to the compùter operating system. This wedge will make a slight difference to the speed of operation but so small that you will not notice it and your normal Basic programs will still be able to work even when the utilities are loaded.

The statements from LDA SE2 to BEW £11CF move the machine code from $1200 to $29FF into high RAM from $E300 to $FAFF.

New values for the top of memory are loaded into the pointers at $33,$34,$37 and $38 finishing with a return RTS which returns us to the basic programs to print the header.

The rest of the machine code works from high RAM but for explanation I will refer to its low RAM location. However, after you've typed the initialisation routine and run the program to relocate at $E300, you could disassemble from the new locations for a clearer idea of what is happening.

The routines from $1200 to $1212 are the ROM and RAM switches (dealt with in *Your Commodore*, May-July '86). These will be moved to the tape buffer area $03E0 by instructions $1213 to $121E when the routines are activated.

$121F to $1242 is the routine to enable high RAM to use sub-routines in Hi ROM (*Your Commodore* July '86).

$1243 to $125D checks if the computer is dealing with a direct command, if not the wedge returns the computer to the GETCHR routine with the JMP $0481 command.

$1269 to $12AA checks to see if the direct command is one of ours, if not it returns to Basic by the branch statement at $1276.

A list of the new commands is given from $12AB to $12CF, these are stored with the last letter shifted i.e. FIND is stored as £46,£49,£4E and finally $C4. I have left a little space from $12BC to

**FIG. 4 ROM SUBROUTINE**

```
>E3D0 00 E4 E4 EB 00 00 00 09
>E3D8 FF D8 00 00 00 FF 89 8E
>E3E0 90 90 94 9C A4 A4 FA FF
>E3E8 FF FF FF FF FF FF FF FF
>E3F0 FF E3 52 3D 3D B1 70 47
>E3F8 6E 5E 9F 95 A4 AA B3 B9
>E400 BC BF C2 CB D1 EA 00 01
>E408 0D F8 A5 3B 8D 3B E4 8D
```

$12CF for your new commands when you write your own utility. (Actually the space will be in high RAM from $E3BC to $E3CF.

The addresses of the new rotuines (-1) are stored as Hi bytes from $12D1 and Lo bytes from $12D7. Remember the stack adds one to the pointers stored on the stack when a RTS is encountered in the program.

Notice that I've left three zero bytes at the end of each list to enable you to add your own routines later.

If one of our new routines is required then its address is pushed on to the stack at $12A0 to $12A9 and then goes to the routine on meeting the RTS at $12AA.

### Entering the Code

We will now enter the code at the place where it normally exists.

Remember that before you start to enter the routine you will need to be in high RAM and you will need to alter the memory location $07F8 to to $80 so that RAM will be displayed rather than ROM. Figure 4 shows the storage for the ROM subroutine addresses that will be available for our program. Figure 5 is the FIND routine, Figure 6 gives the MERGE routine, Figure 8 gives the ASSEMBLER program.

When you have entered all the code, or at an intermediate stage if you like, save the program as follows.

(a) Type X[RETURN] to go back to Basic, then NEW [RETURN].

(b) LOAD'UTILITIES' if on tape. DLOAD'UTILITIES' if on disk. DO NOT RUN

(c) Type M[**Shifted0**] [RETURN] to go into monitor.

(d) Check that location $07F8 is $80.

(e) Type T E300 FB00 1200. This will transfer our machine code to low RAM to join our Basic program.

(f) Return to Basic with X [RETURN].

(g) Save with the normal instruction.
SAVE 'UTILITIES' – tape
DSAVE' UTILITIES' – disk

At the start of the next session LOAD and RUN the program in the normal Basic manner. Continue to enter the machine code from where you left off and, at the end, save as above.

### Check Program

Remember that it is always a good idea to save machine code programs before you run them in case you have made a typing mistake which makes the program hang. If you do get a hang up, press the RUN/STOP key and keep it pressed while you press the reset button. If you have difficulties, load the check program Figure 8. RUN and check the values given in the table, Figure 9. This will enable you to find which section has the mistake.

The machine code program that you have now entered is an aid to programmers. It contains three programs: FIND, MERGE, ASSEMBLE.

### Procedure

It is a good idea to keep the program as the first on a disk when SHIFTED RUN/STOP will load and run the program. For a cassette system, load and run in the normal manner. You should see the title of the program which will have loaded into the top of RAM. The top of memory pointers will also have been lowered to protect the program. Basic programs can now be used as required. FIND, MERGE and ASSEMBLE will also be available.

### FIND

This command will print all the Basic lines containing the sequence of characters following the command e.g.

FIND PRINT will list all the lines in the program containing the word PRINT.

Note: If you wish to search for a sequence that is inside literates then you must put literates after the command FIND e.g.

FIND "PRINT searches for the word PRINT inside literates. It will find different lines to FIND PRINT.

### MERGE

This routine will merge a program on disk with a program in memory. If the

**FIG. 5 FIND ROUTINE**

```
>E408 0D F8 A5 3B 8D 3B E4 8D
>E410 55 E4 8E 06 E4 A2 01 20
>E418 1F E3 A5 2B 85 5F A5 2C
>E420 85 60 A0 01 84 0F B1 5F
>E428 F0 42 A2 00 20 1F E3 C9
>E430 03 F0 39 A0 03 A2 FF 84
>E438 03 E8 BD 04 02 F0 30 C9
>E440 20 F0 F6 C9 22 F0 F2 C8
>E448 B1 5F F0 12 C9 20 F0 F7
>E450 C9 22 F0 F3 5D 04 02 F0
>E458 E0 A4 03 C8 D0 D7 A0 00
>E460 B1 5F AA C8 B1 5F 86 5F
>E468 85 60 D0 B6 4C E5 E4 A0
>E470 01 84 0F 8E 06 E4 A2 03
>E478 20 1F E3 C8 B1 5F AA C8
>E480 B1 5F 84 49 8E 06 E4 A2

>E488 08 20 1F E3 A9 20 A4 49
>E490 29 7F 8E 06 E4 A2 04 20
>E498 1F E3 C9 22 D0 06 A5 0F
>E4A0 49 FF 85 0F C8 F0 C5 B1
>E4A8 5F F0 B3 10 E5 C9 FF F0
>E4B0 E1 24 0F 30 DD AA 84 49
>E4B8 A0 81 84 23 A0 8E 84 22
>E4C0 A0 00 0A F0 11 CA 10 0D
>E4C8 E6 22 D0 02 E6 23 20 EA
>E4D0 03 10 F5 30 F0 C8 20 EA
>E4D8 03 30 B3 8E 06 E4 A2 04
>E4E0 20 1F E3 D0 F0 8E 06 E4
>E4E8 A2 03 20 1F E3 A0 01 A9
>E4F0 00 91 3B 88 A9 3F 91 3B
>E4F8 4C 81 04 FF DF FF FF FF
```

program on disk has line numbers the same as the program already in memory then the new program will contain both lines! The RENUMBER command could be used to allocate unique numbers to each line.

Example
(i) Type in a simple Basic program and save using a name without sapces for instance PROG1.
(ii) Clear and type in another program then try the MERGE command:

MERGE"PROG1"

This will merge all PROG1 with the second program.
The command:

MERGE"PROG1",a-b (where a and b are decimal numbers)
would merge only lines from a to b inclusive.

## ASSEMBLER

This program uses the normal Basic editor and the full facilities of the basic editor are available.

The Assembler language program (source code) is entered as a Basic program. After entry type:

ASSEMBLE [RETURN]

The source code will be assembled and entered direct into the memory locations. The inbuilt monitor may be used to save the machine code.
Note: The word ASSEMBLE may be abbreviated to A[SS] i.e. A followed by SHIFTED S.

If a printed copy is required then type OPEN4,4: CMD4 followed by return before the ASSEMBLE command.

### Assembler Language Statements

Each statement should start with a line number and only one assembler statement is allowed on each line.

Examples of valid lines are:

```
10 LDA $45
20 LOOP TXA
30 LABEL STA(FRED),Y
40 ;COMMENT ONLY
```

### Labels and Variables

Values may be assigned to variables by statements such as:

**FIG. 6 MERGE ROUTINE**

```
>E500 4C 25 E5 E6 3B D0 02 E6
>E508 3C 8C 07 E4 A0 00 B1 3B
>E510 AC 07 E4 8D 08 E4 C9 3A
>E518 B0 0A C9 20 F0 06 38 E9
>E520 30 38 E9 D0 60 8E 06 E4
>E528 A2 01 20 1F E3 20 03 E5
>E530 C9 22 F0 06 C6 3B C6 3B
>E538 10 F3 A2 00 8E 06 E4 A2
>E540 06 20 1F E3 85 04 A5 22
>E548 85 02 A5 23 85 03 20 09
>E550 E5 C9 00 D0 11 A9 00 8D
>E558 F8 E7 8D F9 E7 A9 FF 85
>E560 14 85 15 4C A9 E5 C9 2C
>E568 F0 05 A9 AD 4C A4 E7 20
>E570 03 E5 90 05 A9 B7 4C A4
>E578 E7 8E 06 E4 A2 02 20 1F
>E580 E3 A5 14 8D F8 E7 A5 15
>E588 8D F9 E7 20 09 E5 C9 AB
>E590 F0 05 A9 C5 4C A4 E7 20
>E598 03 E5 90 05 A9 D0 4C A4
>E5A0 E7 8E 06 E4 A2 02 20 1F
>E5A8 E3 A9 01 A2 FA A0 E7 20
>E5B0 15 E7 20 75 E7 AD FB E7
>E5B8 D0 05 A9 DE 4C A4 E7 A2
>E5C0 03 A0 FF C8 C4 04 F0 15
>E5C8 E8 BD 33 03 C9 20 F0 F8
>E5D0 C9 22 F0 F4 B1 02 5D 33
>E5D8 03 F0 E8 D0 D5 20 52 E7
>E5E0 A5 2E 85 48 18 6D 35 03
>E5E8 85 42 38 A5 2E E5 2C 18
>E5F0 69 01 AA A4 2D A9 00 85
>E5F8 47 85 41 B1 47 91 41 88
>E600 C0 FF D0 F7 C6 48 C6 42
>E608 CA D0 F0 A5 04 A6 02 A4
>E610 03 20 15 E7 E6 47 E6 48
>E618 E6 41 E6 42 A0 01 B9 33
>E620 03 F0 3D AD FB E7 F0 38
>E628 A0 03 B9 33 03 CD F9 E7
>E630 F0 08 B0 12 20 75 E7 4C
>E638 1C E6 A0 02 B9 33 03 CD
>E640 F8 E7 B0 02 D0 EE A0 03
>E648 B9 33 03 C5 15 F0 04 90
>E650 16 B0 E1 A0 02 B9 33 03
>E658 C5 14 F0 0B 90 09 B0 D4
>E660 B1 41 D0 21 4C B7 E6 A0
>E668 01 B1 41 D0 02 F0 31 A0
>E670 03 B9 33 03 D1 41 F0 04
>E678 90 26 B0 09 A0 02 B9 33
>E680 03 D1 41 90 1B A0 00 A2
>E688 00 B1 41 20 0A E7 E6 41
>E690 D0 02 E6 42 E8 E0 05 90
>E698 F0 C9 00 D0 EC 4C 1C E6
>E6A0 A2 00 BD 33 03 20 0A E7
>E6A8 E8 E0 05 90 F5 C9 00 D0
>E6B0 F1 20 75 E7 4C 1C E6 20
>E6B8 52 E7 A9 00 20 0A E7 20
>E6C0 0A E7 A5 2B 85 2D A5 2C
>E6C8 85 2E A0 01 B1 2D F0 22
>E6D0 C8 C8 C8 B1 2D D0 FB C8
>E6D8 18 98 A0 00 65 2D 91 2D
>E6E0 85 2F A5 2E 69 00 C8 91
>E6E8 2D 85 2E A5 2F 85 2D 4C
>E6F0 CA E6 18 A5 2D 69 02 90
>E6F8 02 E6 2E 85 2D 85 2F 85
>E700 31 A5 2E 85 30 85 32 4C
>E708 E5 E4 A0 00 91 47 E6 47
>E710 D0 02 E6 48 60 8E 06 E4
>E718 A2 0F 20 1F E3 A9 01 8D
>E720 FB E7 A2 08 A0 60 8E 06
>E728 E4 A2 0E 20 1F E3 8E 06
>E730 E4 A2 10 20 1F E3 A9 08
>E738 8E 06 E4 A2 0D 20 1F E3
>E740 A9 60 8E 06 E4 A2 0A 20
>E748 1F E3 A9 00 85 90 20 6D
>E750 E7 60 8E 06 E4 A2 0C 20
>E758 1F E3 A9 01 8E 06 E4 A2
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>EC00 3B F0 0F C9 00 F0 0B C9
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>EC30 85 0F 4C 25 EC AD 08 E4
>EC38 F0 3B 10 E5 C9 FF F0 E1
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>EC78 60 A4 5D 88 B1 45 99 30
>EC80 F5 88 10 F8 60 A9 3D 8D
>EC88 36 F5 A0 00 20 03 E5 C9
```

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>EC98 37 F5 C8 D0 EF 60 A0 00
>ECA0 B1 45 C9 20 F0 14 B1 45
>ECA8 C9 2F 90 0C C9 3A F0 08
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>F530 20 20 20 20 20 20 20 20
>F538 20 20 20 20 20 20 20 20
>F540 20 20 20 20 20 20 20 20
>F548 20 20 20 20 20 20 20 20
```

50 STROUT=$9088

Or by using them as labels in statement lines:

60 LOOP TXA

Statement 50 will assign the HEX value $9088 to STROUT.
Statement 60 will assign the current location to LOOP.

Note that a label should be separated from the Op-Code by a space. Also the first three letters of a label should not normally be an Op-Code e.g.

10 LDA LDA$45

would not be accepted.

If such a label is essential then use a colon after the label.

10 LDA:LDA$45

would be acceptd by the program.

The two types of statement should not be used on one line

i.e. 10 LOOP STROUT=$9088 is not permitted.

Variables may be up to six characters in length and may be a mixture of alpha-numeric characters.

Statements of the type:

30 LABEL=NAME

are only valid if NAME has already been defined. (If not LABEL would be given the default value $FFFF).

It is particularly important that all zero page addresses are defined before they are used.

Difficulties may arise if these simple rules are not followed, for example:

ASC
ASC-HX
ASC-IN

would be taken as identical, since the first non alpha-numeric character is used in the ASSEMBLER program as a terminator.

The symbol * has a special meaning:

10*=$800

assigns the next code to location $8000 and the ASSEMBLER will continue assembling from this point. The default value has been set at $0333.

The symbol * may not be used as a variable or label e.g.

BNE *+2

will not work (Use BNE 2).

The ASSEMBLER runs through the assembler language program twicce, the first time allocating values to variables and labels, the second run produces the print out. In a long program there will be a short pause before the print-out commences.

## Comments

Comments should be preceded by a semi-colon.

(i) If the comment follows a normal instruction it should be limited to 35 characters – all characters after this will be ignored.
(ii) If the statement contains only a comment then the print out will be offset to the left. The comment may then be up to 57 characters.
(iii) If the statement contains only a semi-colon then nothing will be printed but a carriage return/line feed will be sent to the screen or printer. This is useful when it is required to leave a gap between different sections of the program.

## Op-codes

All the 6502/7501 op-codes are accepted plus an additional three.
(i) TXT' will load all characters after the apopstrophe into memory as ASCII codes.
(ii) WRD OPERAND will load the operand as low then high bytes.
(iii) BYT OPERAND will load an OPERAND of value less than 256 as one byte.
BYTE LABEL will load the low byte of LABEL.

BYT LABEL will load the high byte of LABEL.

## Modes

Different modes are recognised by the following normal convention:
IMPLIED and ACC – Op-code with no operand – SEC.
ABSOLUTE – Op-code with absolute operand – LDA$1001. ZERO-PAGE – Op-code with zero-page operand – LDA$30.
INDIRECT – Operand in brackets – JMP($3020).
INDEXED – Operand followed by comma then X or Y (Default value is Y). LDA 5672,Y.
INDIRECT INDEXED – Brackets Comma – LDA (64),Y.
INDEXED INDIRECT – Bracket Comma + Bracket – LDA(64,X).
IMMEDIATE – before operand – LDA $32.
RELATIVE – Recognised from coding – BCC LABEL.

## Operands

There are several types of operands.
(i) Base 10 – 5230.
(ii) Hex – $A12B.
(Note: Hex numbers must be preceded by a dollar sign and have either two or four characters e.g. $02 not $2.)
(iii) Binary – %10010011
(Note: Binary starts with % and may have up ti eight digits of either one or zero.)
(iv) ASCII – 'B
(Note: Start with ' and limited to one character apart from TXT). Care is needed here since the program uses the Basic editor. Statements such as:

10 LDA '7

are liable to be changed by the Basic editor to 10 LDA 'PRINT. The same problem arises with SHIFTED

**FIG. 7 ASSEMBLER**

```
>E838 FF 7F EF FF FF BF 7F 04
>E840 A4 00 07 00 2C 00 23 00
>E848 6D 00 2E 00 2F 00 AC 26
>E850 AA 41 44 43 42 6D 41 44
>E858 43 43 7D 41 44 43 44 79
>E860 41 44 43 45 69 41 44 43
>E868 47 61 41 44 43 48 71 41
>E870 44 43 49 65 41 44 43 4A
>E878 75 41 4E 44 42 2D 41 4E
>E880 44 43 3D 41 4E 44 44 39
>E888 41 4E 44 45 29 41 4E 44
>E890 47 21 41 4E 44 48 31 41
>E898 4E 44 49 25 41 4E 44 4A
>E8A0 35 41 53 4C 41 0A 41 53
>E8A8 4C 42 0E 41 53 4C 43 1E
>E8B0 41 53 4C 49 06 41 53 4C
>E8B8 4A 16 42 43 43 41 90 42
>E8C0 43 53 41 B0 42 45 51 41
>E8C8 F0 42 49 54 42 2C 42 49
>E8D0 54 49 24 42 4D 49 41 30
>E8D8 42 4E 45 41 D0 42 50 4C
>E8E0 41 10 42 52 4B 41 00 42
>E8E8 56 43 41 50 42 56 53 41
>E8F0 70 42 59 54 00 00 43 4C
>E8F8 43 41 18 43 4C 44 41 D8
>E900 43 4C 49 41 58 43 4C 56
>E908 41 B8 43 4D 50 42 CD 43
>E910 4D 50 43 DD 43 4D 50 44
>E918 D9 43 4D 50 45 C9 43 4D
>E920 50 47 C1 43 4D 50 48 D1
>E928 43 4D 50 49 C5 43 4D 50
>E930 4A D5 43 50 58 42 EC 43
>E938 50 58 45 E0 43 50 58 49
>E940 E4 43 50 59 42 CC 43 50
>E948 59 45 C0 43 50 59 49 C4
>E950 44 45 43 42 CE 44 45 43
>E958 43 DE 44 45 43 49 C6 44
>E960 45 43 4A D6 44 45 58 41
>E968 CA 44 45 59 41 88 45 4F
>E970 52 42 4D 45 4F 52 43 5D
>E978 45 4F 52 44 59 45 4F 52
>E980 45 49 45 4F 52 47 41 45
>E988 4F 52 48 51 45 4F 52 49
>E990 45 45 4F 52 4A 55 49 4E
>E998 43 42 EE 49 4E 43 43 FE
>E9A0 49 4E 43 49 E6 49 4E 43
>E9A8 4A F6 49 4E 58 41 E8 49
>E9B0 4E 59 41 C8 4A 4D 50 42
>E9B8 4C 4A 4D 50 46 6C 4A 53
>E9C0 52 42 20 4C 44 41 42 AD
>E9C8 4C 44 41 43 BD 4C 44 41
>E9D0 44 B9 4C 44 41 45 A9 4C
>E9D8 44 41 47 A1 4C 44 41 48
>E9E0 B1 4C 44 41 49 A5 4C 44
>E9E8 41 4A B5 4C 44 58 42 AE
>E9F0 4C 44 58 44 BE 4C 44 58
>E9F8 45 A2 4C 44 58 49 A6 4C
>EA00 44 58 4B B6 4C 44 59 42
>EA08 AC 4C 44 59 43 BC 4C 44
>EA10 59 45 A0 4C 44 59 49 A4
>EA18 4C 44 59 4A B4 4C 53 52
>EA20 41 4A 4C 53 52 42 4E 4C
>EA28 53 52 43 5E 4C 53 52 49
>EA30 46 4C 53 52 4A 56 4E 4F
>EA38 50 41 EA 4F 52 41 42 0D
>EA40 4F 52 41 43 1D 4F 52 41
>EA48 44 19 4F 52 41 45 09 4F
>EA50 52 41 47 01 4F 52 41 48
>EA58 11 4F 52 41 49 05 4F 52
>EA60 41 4A 15 50 48 41 41 48
>EA68 50 48 50 41 08 50 4C 41
>EA70 41 68 50 4C 50 41 28 52
>EA78 4F 4C 41 2A 52 4F 4C 42
>EA80 2E 52 4F 4C 43 3E 52 4F
>EA88 4C 49 26 52 4F 4C 4A 36
>EA90 52 4F 52 41 6A 52 4F 52
>EA98 42 6E 52 4F 52 43 7E 52
>EAA0 4F 52 49 66 52 4F 52 4A
>EAA8 76 52 54 49 41 40 52 54
>EAB0 53 41 60 53 42 43 42 ED
>EAB8 53 42 43 43 FD 53 42 43
>EAC0 44 F9 53 42 43 45 E9 53
>EAC8 42 43 47 E1 53 42 43 48
>EAD0 F1 53 42 43 49 E5 53 42
>EAD8 43 4A F5 53 45 43 41 38
>EAE0 53 45 44 41 F8 53 45 49
>EAE8 41 78 53 54 41 42 8D 53
>EAF0 54 41 43 9D 53 54 41 44
>EAF8 99 53 54 41 47 81 53 54
>EB00 41 48 91 53 54 41 49 85
>EB08 53 54 41 4A 95 53 54 58
>EB10 42 8E 53 54 58 49 86 53
>EB18 54 58 4B 96 53 54 59 42
>EB20 8C 53 54 59 49 84 53 54
>EB28 59 4A 94 54 41 58 41 AA
>EB30 54 41 59 41 A8 54 53 58
>EB38 41 BA 54 58 41 41 8A 54
>EB40 58 53 41 9A 54 58 54 00
>EB48 00 54 59 41 41 98 00 00
>EB50 41 42 53 2E 20 41 44 44
>EB58 52 45 53 53 20 46 4F 52
>EB60 20 5A 45 52 4F 20 50 41
>EB68 47 45 20 49 4E 44 49 52
>EB70 45 43 54 20 4C 49 4E 45
>EB78 20 00 4F 55 54 20 4F 46
>EB80 20 52 41 4E 47 45 20 41
>EB88 44 44 52 45 53 53 20 4C
>EB90 49 4E 45 20 00 53 54 41
>EB98 52 54 20 54 45 58 54 20
>EBA0 57 49 54 48 20 27 20 4C
>EBA8 49 4E 45 20 00 4F 50 2D
>EBB0 43 4F 44 45 20 45 52 52
>EBB8 4F 52 20 4C 49 4E 45 20
>EBC0 00 55 4E 44 45 46 49 4E
>EBC8 45 44 20 41 44 44 52 45
>EBD0 53 53 20 4C 49 4E 45 20
>EBD8 00 4C C0 EF A0 00 A2 00
>EBE0 20 03 E5 C9 22 F0 F9 48
>EBE8 A5 3B 85 45 A5 3C 85 46
>EBF0 68 4C F7 EB 20 03 E5 C9
```

characters – they may disappear altogether. Lines that will give rise to problems should be spotted if the source program is listed before assembling. Lines can be protected by putting literate marks at the start of the line.

10 "LDA '?

would give no problems.

(v) A defined variable or label. e.g. LABEL where LABEL is defined somewhere in the program as indicated earlier.

## Modifications or Operands

Operands may be modified by up to + or - 255 using statements such as:

LDA LABEL+3

The IMMEDIATE and BYT have a further modification available:

LDA LABEL

will load the low byte of LABEL.

LDA LABEL

will load the high byte of LABEL

## BRANCH

A branch op-code, may be followed by an address (variable) when the program will calculate the size of the displacement or alternatively the programmer may calculate the displacement required.

BNE LOOP

means a branch to LOOP.

BNE 6

means a branch of +6 from next op-code.

## Errors

Details of errors are printed during assembly and also at the end of the assembly.

The address of labels are also printed at the end of the assembly.

**FIG. 8 CHECK PROGRAM**

```
100 A$="E3D0":A=DEC(A$)
110 FORX=0TO34:SUM=0
120 FORY=0TO127
130 SUM=SUM+PEEK(A+Y)
140 NEXTY
150 PRINTHEX$(A)" TO "HEX$(A+127)"  "SUM
160 A=A+128
170 NEXTX
```

## Memory Allocation

(i) WEDGE, FIND, MERGE, ASSEMBLER from $E300 to $F650.
(ii) Assembler Source Language program as normal Basic from $1001.
(iii) Eight bytes of memory are required to store each label used in the program. The labels are stored in RAM following the source program. Details of errors are stored after the labels, each error needing three bytes of storage. No out of memory error has been incorporated in the ASSEMBLER program.
(iv) A small part of the cassette tape buffer is used by the program, namely $03E0 to $03F2. This area should not be used for program location.
(iv) There is a protected area above ASSEMBLER which could be used for machine code programs. This area is from $F651 to $FCFF.

## SAVING and LOADING

The in-built Plus/4 monitor may be used to save machine code programs e.g.

S"PROGRAM",8,7000,7100

would save from $7000 to $7100 under the name PROGRAM on to disk.
To load from disk use LOAD "PROGRAM",8,1.

Source code programs may be saved and loaded as normal Basic programs.

That's it! Try it, you should find it very useful. YC

**FIG. 9 CHECK VALUES**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E3D0 | TO | E44F | 17871 | ECD0 | TO | ED4F | 14846 |
| E450 | TO | E4CF | 16139 | ED50 | TO | EDCF | 13243 |
| E4D0 | TO | E54F | 14648 | EDD0 | TO | EE4F | 14522 |
| E550 | TO | E5CF | 17870 | EE50 | TO | EECF | 14646 |
| E5D0 | TO | E64F | 15981 | EED0 | TO | EF4F | 14415 |
| E650 | TO | E6CF | 14685 | EF50 | TO | EFCF | 14067 |
| E6D0 | TO | E74F | 14268 | EFD0 | TO | F04F | 16063 |
| E750 | TO | E7CF | 12862 | F050 | TO | F0CF | 16638 |
| E7D0 | TO | E84F | 13496 | F0D0 | TO | F14F | 12295 |
| E850 | TO | E8CF | 9248 | F150 | TO | F1CF | 17010 |
| E8D0 | TO | E94F | 11369 | F1D0 | TO | F24F | 17646 |
| E950 | TO | E9CF | 11289 | F250 | TO | F2CF | 16901 |
| E9D0 | TO | EA4F | 11090 | F2D0 | TO | F34F | 16004 |
| EA50 | TO | EACF | 10127 | F350 | TO | F3CF | 15899 |
| EAD0 | TO | EB4F | 11579 | F3D0 | TO | F44F | 15369 |
| EB50 | TO | EBCF | 8313 | F450 | TO | F4CF | 14908 |
| EBD0 | TO | EC4F | 15248 | F4D0 | TO | F54F | 10203 |
| EC50 | TO | ECCF | 16305 | | | | |

# Graphic Environment Operating System

*Windows, Icons and Menus all form part of the new easy to use operating system that you can add to your C64 with GEOS.*

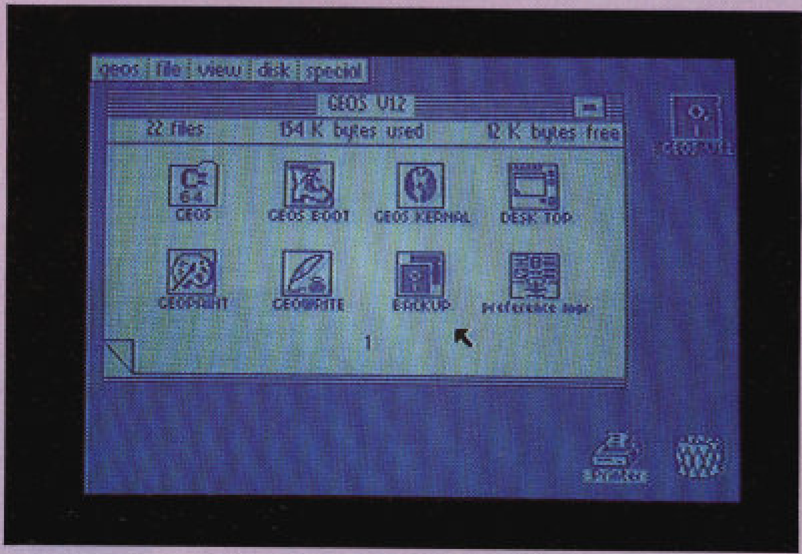
***By Stuart Cooke***

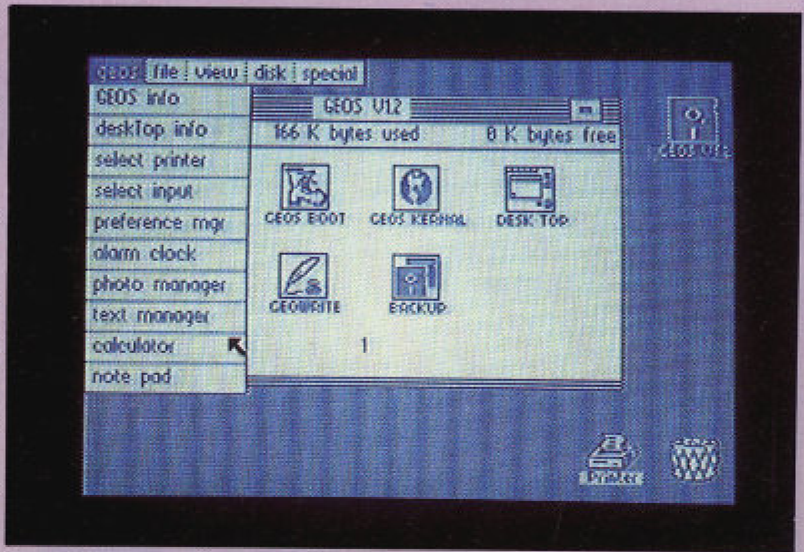
When first introduced to computers, people shrink in horror at the sheer number of commands that you need to know before you can get your computer to work. Take a look at the C64 with its complicated disk commands which no greenie to computers is going to remember straight away. It is therefore not surprising that someone has at long last come up with a product that will make communication between you, your C64 and its Commodore disk drive a lot easier and much more pleasant.

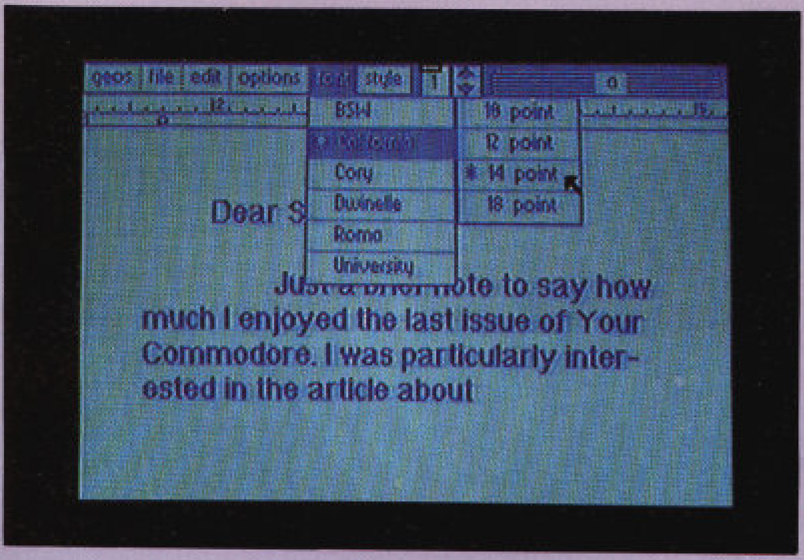
*GEOS* replaces many of the usual typed commands with a series of pictures, called icons, making handling of your input much easier. For example instead of having to type in the usual LOAD "name", device, secondary-address command as you normally would with a C64 program you simply have to move your pointer to the icon or 'picture' of the program that you require, select it by pressing the button, next choose LOAD from the appropriate menu and it's away you go.

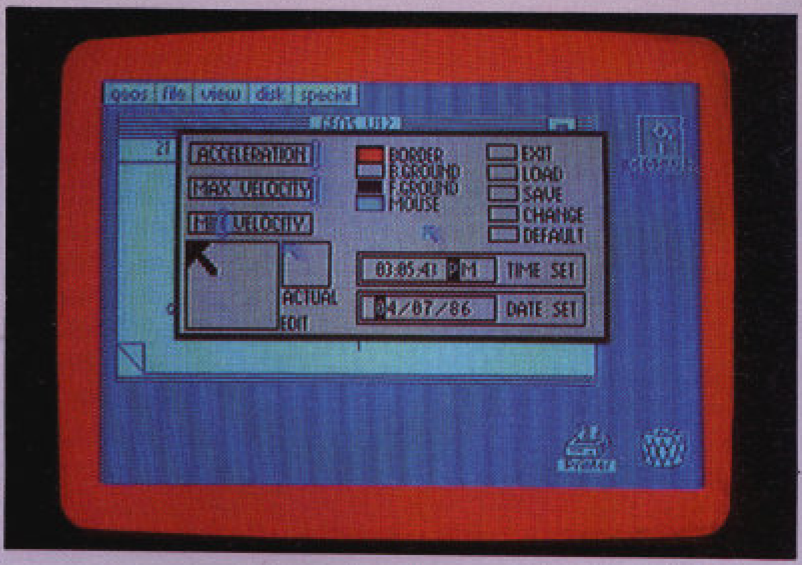
Not only does *GEOS* improve your communication with your computer but rather it gives you access to a whole host of facilities. For example you have faster disk access, a desk top which offers you facilities such as calendars and alarm clocks and a calculator. With the software supplied you also get a graphics program called *quite original – GEOPAINT* and a pseudo Wordprocessor called *GEOWRITE.*

Perhaps the best way to describe the operation of the program is to refer to the pictures accompanying this review.






Once you have loaded *GEOS* into your C64 you will be presented with a display similar to that in photograph 1. The large area in the centre of the screen shows what programs are on the disk in the drive – or rather a portion of the files on disk. If you look at the bottom corner of this 'page' you will find a 'dog-ear', move your pointer to this and the next page of programs on the disk is shown. If you examine the screen shot more closely you will see that each of the files has a different picture associated with it. This enables you to see at a glance what type of program each one is. For example the picture with the palette is a graphics program – easy isn't it?

Whenever you save a program while using *GEOS* the date and time that it was SAVEd is noted together with a small amount of text if you like. As you may already know it is possible to protect files on a C64 disk, however Commodore didn't give any easy way to use this extremely useful facility, with *GEOS* you can now protect and unprotect files with ease.

Any C64 disk can be used with *GEOS*. Should you use one that hasn't been set up for use with *GEOS*, all of the files will be given the symbol of an index card with a standard Commodore logo on it. This symbolises an old-style C64 program. You do have the option of turning your disks into *GEOS* disks and this doesn't alter the contents of your disk at all but does take up some room. Changing a disk withing *GEOS* is also extremely easy. Move the pointer to the disk LOGO and press the button, the files now displayed on the screen will be those that are on the current disk in the drive.

Across the top of the area that is used to illustrate the contents of the disk currently being used you will find a series of Menus. Should you move the pointer to one of these, the menu will 'pull down' and the various options available are shown. Photograph 2 shows the *GEOS* menu. As you can see each menu has a number of different commands available, I will deal with each one in turn so that you know what is available.

## GEOS

This menu is used to access a number of different desk accessories. You needn't have all of these available on the disk you are using, after all if you never use the calculator option then you may as well remove it from the disk directory so that you get more room for program storage. The options available on the standard *GEOS* disk when you select this menu are the PREFERENCE MANAGER which allows you to change the actual colours that are being used on the screen. You can alter the speed at which the pointer moves and you can also alter the design of the pointer. The preference menu is also where you set up the clock and the date for use within the program.

A calculator is also available which offers 11 functions. You can either point to the numbers on the calculator that appears on the screen when you choose this option or you can simply use the keys, which is far quicker.

A notepad with 127 pages is available for jotting down those important telephone messages and the text and photo managers allow you to transfer little pieces of artwork and text around different programs.

The printer that you are using is also selected from the *GEOS* menu. You must use a printer with grahics capability with GEOS since any printout is actually produced as a grahpics dump rather than using the printers characters set. This is a lot slower than printing straight text but does allow you to use numerous type styles and different fonts.

While on the subject of printers it is worth pointing out that to print any file you simply need to point to it and then move the now highlighted file to the printer icon at the bottom of the screen, the file will now be printed. If you should wish to erase a file simply move the picture to the trash bin instead.

## File

The file menu is where you can start to manipulate your disk files. First on the list of commands from this menu is OPEN which simply LOADS and RUNS the selected file. DUPLICATE allows you to copy an existing file to one of a new name but on the same disk. Copying programs between disks is extremely simple. Select the file that you wish to copy. Move its icon below the file display area. Close the source disk and remove it from the disk drive. Place the new disk into the drive select OPEN from the disk menu move the icon of the file back into the display area and hey presto! One copied file.

RENAME, as its name suggests, allows you to alter the name of any files on your disk. PRINT is the same as dragging the file to the printer – it prints out the contents of the selected file.

The INFO command is extremely interesting as it allows you to examine

specific information about the files on disk this information includes:

Name of the disk where the file is located.
The type of file – system, application etc.
The permanent internal name of file.
The file structure.
The size of the file.
The date and time that the program was last modified.
The name of the programmer.
Whether the program is write protected or not.

## View

This option allows you to select the way in which the files are displayed in the display area. One choice available is ICON, which displays the programs with their icon, as on photos 1 and 2. You can also display the files alphabetically by name, in the order of last modification by size or by the file type.

## Disk

This is where *GEOS* allows you to perform your general maintainance upon your disks. The first option in the menu is OPEN. This will read the disk that is currently in the drive and display the directory on the screen in the format specified in the view option. CLOSE is the opposite to this command and you should always CLOSE a disk before you remove it from the drive.

Copying a whole disk is made possible with the COPY command. This disk copy is intended only for two drive systems and works extremely quickly. Single drive users can still use this command and they will be prompted to swap disks by the program, this may however take 25 swaps to copy a full disk. A BACKUP utility program is provided on the GEOS disk which will need only three disks swaps so is obviously much better.

A new disk obviously needs to be formatted before use. The FORMAT command allows you to do this with ease.

Quite often it is useful to be able to change the name that appears at the top of your disks. The RENAME command allows you to do this.

When you have used a disk for quite some time it is useful to be able to tidy the disk up and check it for errors. Normally you would use the standard Commodore Validate command to perform this. The VALIDATE option in the DISK menu performs the same task.

When you first boot *GEOS* into the computer it is set up for single disk operation. The ADD DISK option enables you to use a second drive with *GEOS*, adding greater flexibility to the system and requiring fewer disk swaps.

## Special

This is the menu that allows you to escape from *GEOS*. The options available allow you to perform a RESET of *GEOS* and reopens the disk. BASIC returns you into standard Commodore Basic. To reload *GEOS* you simply have to make sure that the original *GEOS* is in the drive and hit the RESTORE key. This however will only work if you haven't run any programs that use the area of memory at which the *GEOS* bootstrap sits ($C000).

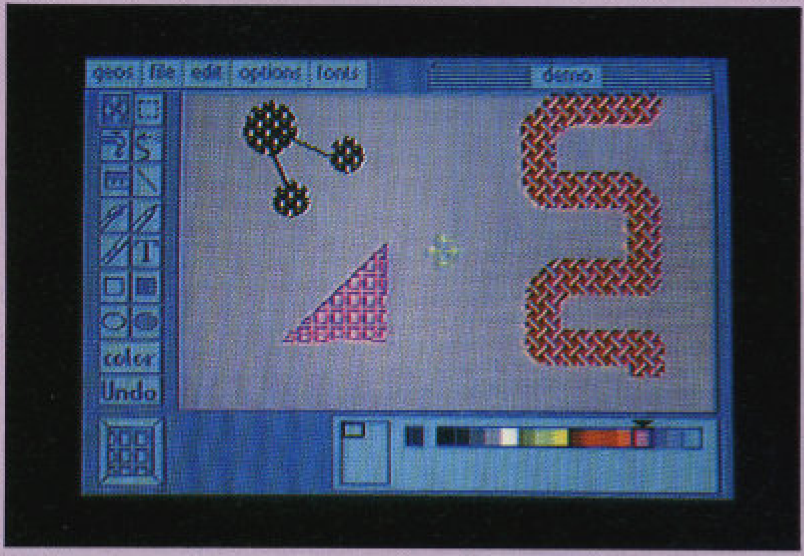
The final option isn't of that much interest to UK users as it boots up a communications program called QLINK. It is important to point out that QLINK is for use with an American communications system and cannot be used in the UK.

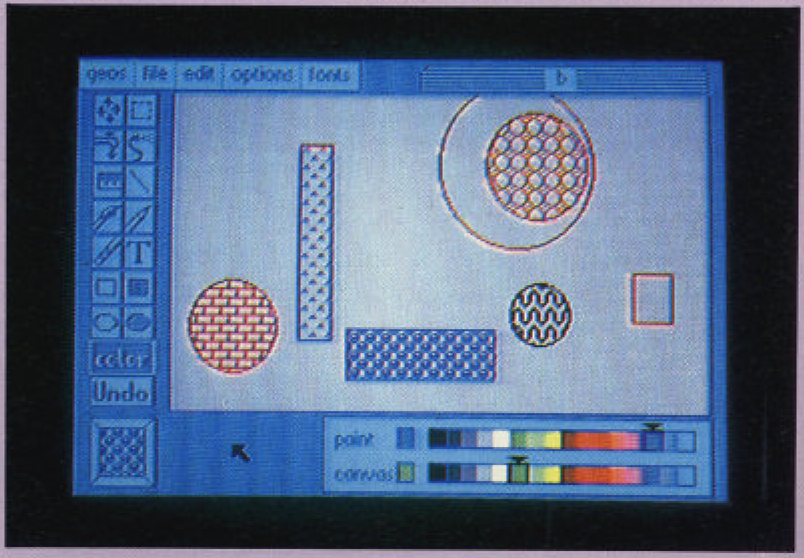
## The Programs

As well as providing an exceptionally friendly front end for disk users, *GEOS* also comes complete with two extremely powerful programs *GEOWRITE* and *GEOPAINT*. Many people have referred to *GEOWRITE* as a wordprocessor but I think that this is going a little far. What *GEOWRITE* does do is allow you to enter text into your C64 in one of a number of available fonts, include pictures that you have produced within *GEOPAINT* and then dump the whole thing to your printer. Missing from the program are all of the usual things that you would expect from a wordprocessor such as search and replace, variable page lengths, different line spacing etc, though you can change margins and tabs as on a typewriter.

*GEOWRITE* is extremely easy to use and should present no problems to anyone who would like to print out a letter or document. To start up the program you simply have to OPEN the GEOWRITE program by using the pointer (NB a quick double press on the button while pointing to the program performs the same function), you will then be asked if you want to create a new file or wish to edit an existing one, again all answers are input via the pointer and controller. Once the necessary information has been entered you will find yourself in *GEOWRITE* staring at the text editing window.

Because the C64 does not display on its screen as many characters as a



printer produces the screen acts as a window over a large piece of paper scrolling as you move around the page. The ability to enter text where you want is particularly important when you want to add pictures that you have created from within *GEOPAINT*. When entering text you do not have to worry about the positioning of words as you would when using a typewriter as the program has an automatic word-wrap facility. This means that if a word will not fit on a line then the computer will automatically start it on the next line of the display for you. Across the top of your document you will see a similar menu to that found when using *GEOS* as a 'front end' for your disks. As before you have the *GEOS* menu which offers you all of your desk top facilities such as calculator etc.

FILE allows you to perform such operations as SAVEing the file to memory for later use or simply updating the copy of the file that is on disk so that you can carry on working knowing that what you have already done is safely on disk.

No matter how proficient a typist you are or how good a writer, you are bound to make some mistakes, thus the EDIT command. This option allows you to remove whole sections of text from the program or simply copy it elsewhere, this is extremely handy for re-organising the structure of your document. Inserting text into a document is also extremely easy, simply move the pointer to the place where you would like to insert and it's away you go!

The options menu has some extremely powerful commands within it. The first of these is the PREVIEW PAGE option. This draws on the screen a high-res picture of what the page will look like. Since the page is greatly reduced this isn't usually legible but it does give you an idea of what your finished page looks like so that you can move things around if necessary.

The second important option is HIDE PICTURES. As previously mentioned, you can insert pictures from *GEOPAINT* into your text. However, every time a picture is displayed on screen it is fetched from disk showing down the whole operation until it is almost unbearable. With this command all pictures are erased from the screen until PRINT or SHOW PICTURES is selected.

## Fonts

Numerous fonts are available for use with the wordprocessor and many of these are available in different sizes. For examples of the text available take a look at Figure 1 which contains a printout of some of the text. As well as being able to alter the type and size of the fonts you can also alter the style in which they are printed. The options available are SOLID i.e. a normal face, BOLD ITALIC, OUTLINE and UNDERLINE. Again, these are shown in Figure 1.

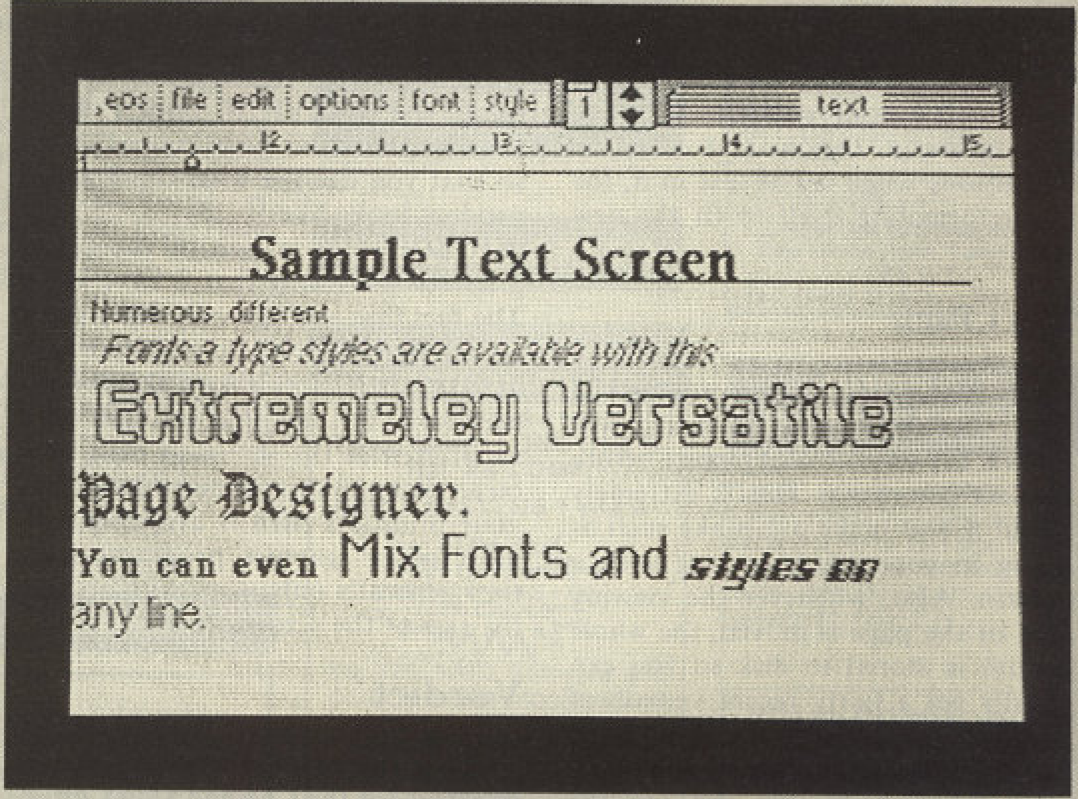
*GEOPAINT* is extremely easy to use though it does have a couple of 'quirks'. For example if you select a new font and start typing, it takes a while for the program to load the new font from disk and then catch you up. This quite often means that you have typed a lot of text that the program has not printed, the way around this is simply to take time when changing fonts.

Typing letters and documents can now be made more interesting by mixing text styles and graphics. However, I don't think that you would find too many people who would like to use this program on an every day basis as wordprocessor, too many functions are missing. It is however great fun.

## Geopaint

This program, supplied with *GEOS*, allows you to create your own charts tables or other graphics for inclusion within any text or you can even design pictures that will occupy a full sheet of printer paper. The program has two modes of operation, 16 colour mode and mono mode. The colour mode allows you to access the full colour capabilities of the C64, any printout being produced in shades of grey. The mono mode allows just two colours which is far better and clearer for pictures that are to be printed out. After all a printer only has two colours, black and white. If you have ever used a graphics program then you will be pleased to know that all of the options that you would expect from a professional graphics program are present.

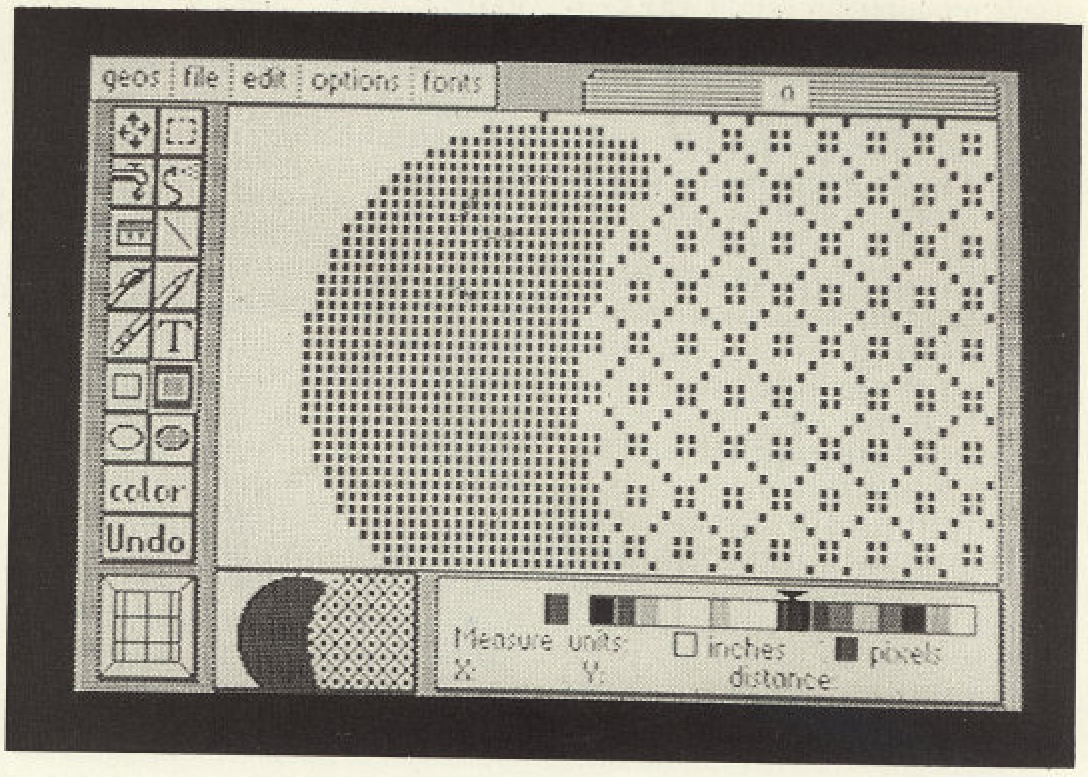
A pencil is used for thin detailed lines around the screen and a brush is used for painting in larger areas. When using a brush it is possible to select the actual shape that the brush takes and what pattern it leaves behind it. A computer brush doesn't need to leave a solid wash of paint, it can leave behind it textures such as checks or bricks. In fact any of 32 different patterns. Should you simply wish to shade an area of your drawing, then the



airbrush is probably what you require. This places random dots on the screen, the longer you hold it on a particular area the more dots you get.

Filling in areas of the screen is made particularly easy with the fill option. Point to the picture of the tap and then to any area on the screen and the area will be rapidly filled with the current pattern. This fill is extremely fast and is one of the best that I have seen in a C64 graphics program.

Options exist for drawing straight lines, the measurements of which are given at the bottom of the screen in a handy readout. There is also a ruler option that allows you to measure distances on the screen, again the figures appear at the bottom of the screen.




## Shapes

Options exist for producing squares and circles with either filled or open centres and both are extremely quick. It would have been nice to see options for other shapes as well such as triangles or elipses although you can draw these with the pencil and lines option, should you need them, and then fill them in using the fill option.

Not only can you copy a picture into a text file but you can also add text into a picture. This is useful for adding text to graphs, labelling pictures or simply leaving your mark on your latest masterpiece. As with the wordprocessor you can choose the text style and font that you require. All text is entered in rectangular text regions. The actual dimensions of the region being under your control. You can even move a region and alter its dimensions when it has text in it, the text reformating itself to fit the new area.

## Don't Panic

As with all good graphics programs, a safety device is available which will recover the state of your picture before the last command. This is extremely useful if you make a mistake such as filling in your whole picture with a pattern. Also, whenever the viewing area of the page is moved, the whole picture is stored to disk so you can usually get a fairly recent version of your artwork back from disk with the RECOVER option. Should you make small errors then you can use the erasor to rub them out.

## Getting Larger

A zoom facility is available which makes it extremely easy to add fine detail to your picture. One extremely nice touch is the way that you can always see an actual size picture of any enlarged area at the bottom of the screen.

## Areas

It is possible to manipulate rectangular areas of the screen in a number of ways. You can invert them, rotate them, copy them, move them and even wipe them clear.

As with the Wordprocessor only a small area of the screen is displayed at once, the PREVIEW option again displays the whole page in small detail so that you can see what the finished product looks like.

*GEOPAINT* is one of the better graphics programs that I have used. The fact that you can only see a small area of the screen is a bit of a hindrance at first but is quite easy when you get used to it. The fact that you only see a small area of the screen at once does mean that you can get more detail into your printouts than is available with most other graphics programs since they generally only work with an area the size of the screen.

## Verdict

*GEOS* provides an extremely easy user interface for the C64 and a disk drive. Myself, I would probably prefer to use the old style Commodore commands for LOADing and RUNing disk programs, though I must admit I have been using them for quite some time. Having shown *GEOS* to a number of computer novices it is clear that they found *GEOS* both quick and easy to use. The programs supplied are extremely powerful and should provide both experienced users and people who are just playing around with some quite satisfying and professional results.

*GEOS* doesn't end here however. As I have stated it is really a new way of communicating with your C64 and disk drive. Numerous new programs are in the pipeline that will be based around the *GEOS* front end. These include a professional wordprocessor and database, a host of new fonts and a set of new desk utilities including a calendar generator, an editor that will allow you to change the icons to suit your own applications, an art grabber that will allow you to swap graphics with other commercial programs and even a game of Blackjack.

If the forthcoming programs can manage to maintain the same ease of use as the ones provided with the program, then *GEOS* is certainly a winner. YC

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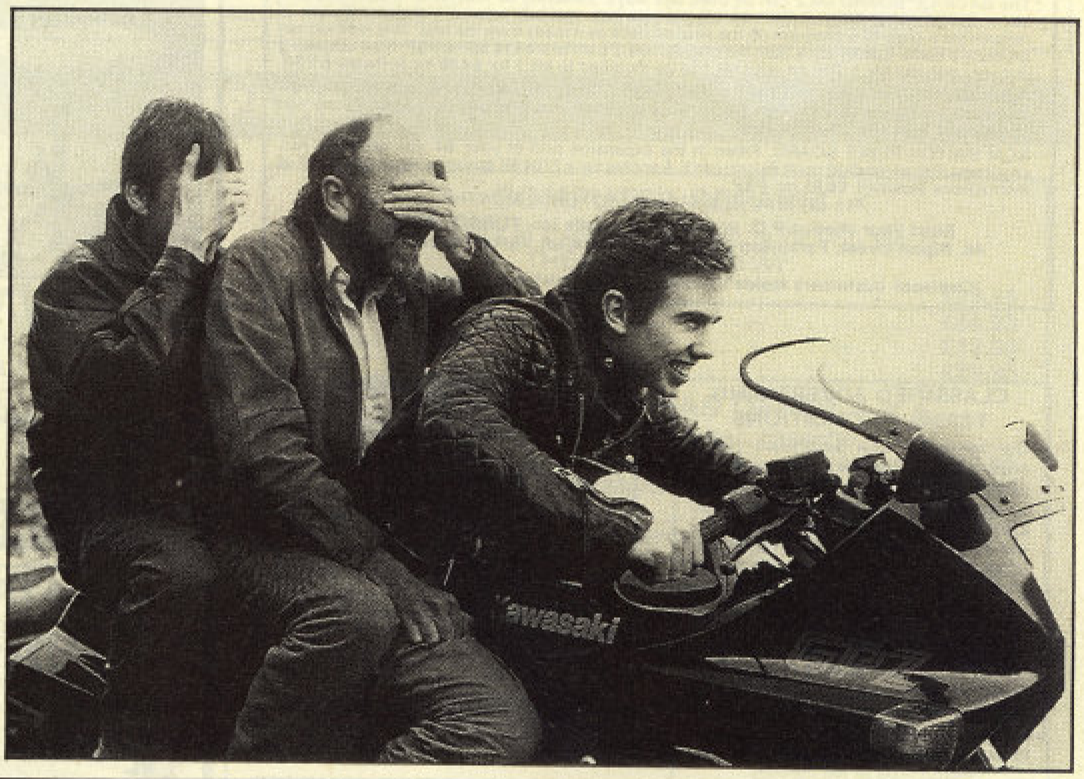
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# B R E A K

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*N*ew software house, Codemasters (see Data Statements) seem to be having a bit of trouble keeping up with life in the fast lane of the software industry!

Darlings Richard, Jim and David look as if they're heading for some thrills and spills. The unimaginative editor on *Your Commodore* couldn't think of a caption to go with this picture so we decided to let our inspired readers have a go at this knotty problem. If you think of the best one then you'll get a crispy fiver for your trouble which you may even want to spend on Code Masters software. Send your entry to Your Commodore Caption Competition, 1 Golden Square, London W1R 3AB. Closing date: Monday 29 December 1986.




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*H*ere are the 20 winners of our Global Software Competition. The five top prize winners are: Mario Rizzo, Msida, Malta; D Lockie, REME; Mark Outram, Derby; Mark Purvis, Morpeth; Vassilatos Vangelis, Athens. They will all receive a copy of Magician's Ball from Global Software plus copy of Global's Caretaker program. The 15 runners up will receive a copy of Magician's Ball. They are: J. Naud, Orbais, Belgium; Chris Garbutt, Basildon; Steven Collins, Kettering; Salim Patel, Dewsbury; Roy Martin, Birmingham; Michael Swain, Leeds; Tony Carter, Droitwich; Louise Copeland, Clacton-on-Sea; Richard Divers, Carlise; Simon McMongale, Ravenshead; S.E. Williams, Sheffield; Wayne McCormack; J.M.J. White, Belfast; Steven Dickin, Denistone; Mark Plumley, Malton.

## Oops!!

*I*n the November issue of the magazine we stated that it was possible to SAVE the Disk Utility which was on the free cassette on to your disk by simply pressing RUN/STOP and RESTORE and then performing a normal SAVE operation. However, it appears that the turbo which was used to generate the cassette has altered some of the pointers within the program making it impossible to SAVE using the above method. Should you wish to make a copy of the program on your own disk then you can use either of the following methods:

1) Use a machine code monitor to SAVE the program out. The start address of the program, is and the end address

2) This is the easiest method if you don't understand machine code. When the program is running press the RUN/STOP and RESTORE keys at the same time. The computer will now return to the READY prompt. Now enter the following line:

```
POKE43,1: POKE44,8: POKE45,112:
POKE46,78:SAVE"filename",8
```

you will now have a copy of the program on disk.

Editor: Stuart Cooke
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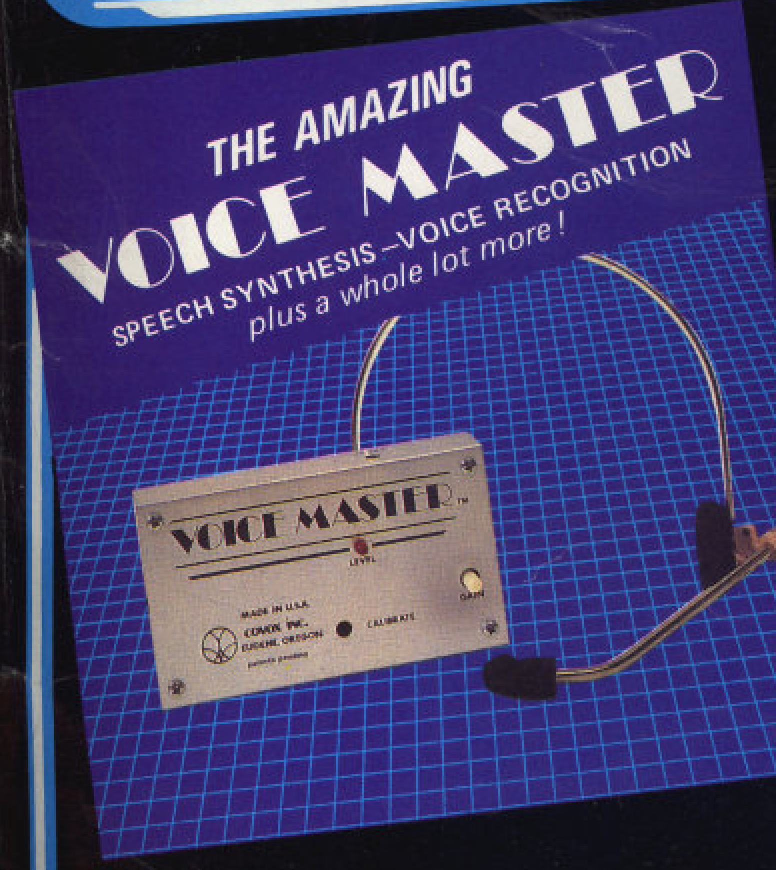
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